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THE EFFECTS OF HELSINKI STOCK EXCHANGE LIQUIDITY PROVIDING ON LIQUIDITY

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ABSTRACT:

This paper studies the possible effects of liquidity providers, i.e. market makers on a company's stock at the Helsinki Stock exchange, which is rather new service available only since 2004 at the exchange. Liquidity providing is marketed as a tool for a company to improve its stocks liquidity and the main objective of this study has been to discover whether market making actually works. The effects in liquidity have been viewed using the bid-ask spread, bid-ask spread volatility and turnover as proxies for liquidity. Also the effects on stock price and possible abnormal returns have been taken into consideration.

The results obtained supported the function of the market maker. The average intraday spread fell from 1.49% to 1.15% during the measuring period. In relation with the decrease, the intraday spread volatility also decreased, implying that the presence of a market maker would have a stabilizing effect. Using trading volumes and zero-volume trading days as proxies for liquidity, it was found that market making had an improving effect. Both proxies experienced an increase after the commencement of market making.

However, two other measures would imply that although liquidity was improved, the stocks were still rather illiquid. Firstly, the commencement of market making did not produce any abnormal returns for the stocks. Although the stock prices rose, the performance was in line with that of the market. Secondly, the price volatility did not experience any changes after the market making begun. If the stocks would have gained enough in liquidity, the amount of informed trading should have decreased in relation to the amount of liquidity trading, lowering the volatility. This however was not visible, implying that although liquidity proving succeeded in its function, more measures are needed to insure overall liquidity.

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1 INTRODUCTION

1.1 Background and purpose

Market making is an active function in many international stock exchanges. It is where a company provides bid ask quotes for stocks, acting as an intermediate. The market maker is not a "long term" investor, but tries to manage inventories, with the purpose of providing a bid and an ask for a security so that investors acting on the market are able to purchase or sell the stock independent of other traders on the market.

OMX also has active market makers functioning on the markets. However, organized market making for stocks at the Helsinki Stock Exchange is relatively new service offered to listed companies. Before year 2004 only few companies on the I-list used the service and there were no criteria set for the market maker. With a model from (then) the Swedish stock exchange, Helsinki Stock Exchange introduced LP – liquidity-providing service in April 2004, where a broker/dealer acts as a market maker for company's share. Before this market making had been common only for Finnish derivatives.

Helsinki Stock Exchange has drafted an agreement for parties to use and also set minimum requirements for the market making. Each market maker is obligated to quote bid and asks worth of 4000 eur with a minimum spread of 4% calculated from the bid price. In most cases the agreed quoting is larger and spread narrower. There are currently 34 securities with Liquidity Provider- agreement trading on the Helsinki exchange. These companies have entered into an agreement with a brokerage company acting as a market maker. Companies pay the market maker to provide markets with an agreed bid-ask spread, each quote containing the agreed number of shares.

Helsinki Stock Exchange was rather small exchange before it was integrated as a part of the Nordic OMX exchange. Currently there are 128 different stocks listed under the OMX Helsinki list, with 120 different companies. Some companies have thus 2 different series listed on the exchange dividing the trading volumes even more. In most cases however, the

other of the shares is highly illiquid with more voting power and extremely low free float. Stock trading volumes at the Helsinki stock exchange were 144 708 mil. eur, 181 161 mil. eur, 224 960 million eur, and 231 571 million during years 2003-2006 respectively. The total trading volume of the five most traded stocks amounted up to 126 094 million Euro year 2003, 149 575 million Euro year 2004, 162 480 million Euro year 2005 and 201 478 million Euro in year 2006. These figures show that the 5 most traded shares totaled 87%, 83%, 72% and 86% of the total annual yearly trading volumes respectively. As the figures clearly indicate, the trading volumes of the remaining 115 shares are low, creating a number of highly illiquid shares of the remaining 118 shares are low, creating a number of highly illiquid shares.

This study will discuss liquidity and the different measures for it. Also the advantages of having sufficient liquidity are closely observed. In addition to liquidity, this study will also discuss the role of market makers and specialists in providing liquidity to the market.

Since the shares trading under the Helsinki list are rather illiquid and market making is relatively new at the Helsinki Stock Exchange the main objective of this study is to determine whether signing a market making agreement really has an effect on the liquidity of a security of a company. The evidence is based on previous international studies and empirical research done on the securities with market making agreements.

1.2 Contribution

Market making has been studied internationally since already over 10 years. In addition market making on derivatives has also been looked at. However, since market making for stocks traded at the Helsinki Stock Exchange is relatively new, only relative few, if any, studies have been conducted. One of the latest studies made on the OMX is the study by Perttu Tevanen (2007) who wrote his thesis on the impact of liquidity providers. However, he studied the effect using closing spreads and prices on daily levels. This study will contribute to his findings by using intraday spreads and spread volatilities, thus observing more closely

the market makers function. In addition to Mr. Tevanen's study on price reaction, this study will contribute by measuring for abnormal returns and return volatility.

Helsinki Stock Exchange itself has also conducted minor studies on whether market making has an effect on the liquidity of the stock mainly by looking at the turnover of the stock one month before and after market making agreement. The study measured the spread, number of trades, Euro amount of trades and total turnover.

The purpose of this study is thus to analyze the arguments for market making at OMX and to see what, if any, affect it has on the stock and its behavior. We will compare the intraday bid-ask spread and its volatility on the stocks before and after market making has commenced. We will also look at possible changes in the risk premium investors require for holding an illiquid asset by not just looking for stock price increases, but also abnormal return. In addition, finally to study the changes in liquidity we will also use trading volumes and zero-volume trading days as proxy for measuring the effect of market makers.

1.3 Limitations of the study

It would be beneficial to study the trading activity of the market maker on the trades, but that will not be looked at, since no such data is available currently. The trading data would only indicate the broker / dealer behind the trade, but no knowledge of who (customer, prop-trading, market maker or internet trader) was behind the trade could not be ascertained.

Perhaps the biggest handicap is that the depth of the market is not studied. This however is currently not possible as no such data is available.

Also, most literature proving the effectiveness of a market maker in providing liquidity is based on large exchanges such as NYSE, NASDAQ, and LSE or on the OTC market. In all of the studies and liquidity measurements there is more than one market maker for each security. At the HSE however there is only one market maker for each security. Therefore the literature

obtained from those studies and the evidence for the effectiveness of market making on the liquidity of the stock might not be fully applicable to the Finnish market as such.

As stated before, there are currently 34 companies which have signed a market making agreement with a brokerage company. Since most of the companies are extremely illiquid, finding enough data proved challenging. 11 of the companies have signed market making contract rather recently, so they were exclude due to the lack of historical data. In addition, out of rest 25 companies only 14 had enough data to view the effects of market making on intraday bid-ask spread. Is the sample enough to get accurate evidence? Some might argue that no, it is not. However, since there is not much more intraday data available, it is the best alternative when looking at market making in Finland.

1.4 Structure of the study

The remainder of this study is organized as follows. Section 2 discusses liquidity and how it can be defined. It also deals with common measures for liquidity and if any, which advantages liquidity brings for a security, more specifically for a stock. Section 3 focuses on market making as a function and determines whether or not it offers any advantages on national level. Also motivations for market makers and companies are discussed. Section 4 states the hypothesis for the empirical study. Section 5 presents a detailed description of the data and methods applied in the study. Section 6 presents the empirical evidence and discusses the results, with section 7 concluding the study.

2 LIQUIDITY

In order to discuss the role of market makers and their role in providing liquidity, we should first examine what is meant by liquidity, the role of liquidity in asset pricing and volatility as well as the "correct" way of measuring it. In this section of the study also the proxies used to measure liquidity are discussed.

"Liquidity is the grease that facilitates the smooth functioning of financial markets. A lack of liquidity is a form of frictions that can have adverse effects on asset values" (Chordia et al 2004). Chordia et al made a very appropriate description of liquidity. However putting it like that makes the definition of liquidity very vague. It should be remembered that different markets have different levels of liquidity. For example, an OTC market, where assets are traded between two parties with privately negotiated transactions, is more illiquid than an organized stock exchange where there is the possibility of multiple buyers and sellers, offering different prices. We will not go into detail comparing different markets or assets classes and their liquidity as in view of this study this would be irrelevant. This study only focuses on liquidity of stocks traded on the exchanges. However, what we will discuss and look more in detail is that there are also considerable differences between securities values because of differences in liquidity.

2.1 Defining Liquidity

Dubofsky et al (1984) state that there are two aspects to liquidity: how fast a desired transaction can be made at the prevailing market price and the price concession that must be offered to sell shares within a given period.

"In a perfectly competitive market, there is infinite liquidity since any number of shares can be sold instantaneously at the market clearing price" (Dubofsky et. al, 1984). As is clear, in most cases infinite liquidity does not exist, nor is it cost free. The execution of a desired transaction is thus related to the number of the shares on the buy and on the sell side and the prevailing bid-ask spread. Liquidity in the sense of limited price changes and speed of

execution is possible only so long as an asset's fundamental value or equilibrium price is unchanged.

OMX describes liquidity on its web-pages as follows: "liquidity is characterized by high turnover, or a high level of trading activity, in a company's share. High turnover, and thereby liquidity, is the result of the combination of a small spread and a high order depth". According to Shen et al (2001) liquid markets will be characterized by a narrow spread and illiquid by a wide spread. Eventually it would thus seem that there is no one definition for liquidity, but that it is a combination of the bid-ask spread, market depth and total turnover. In the following we discuss the importance of liquidity especially in asset pricing and how it could be measured. The measures are themselves a part of forming liquidity.

2.2 Liquidity in Asset pricing

Organized stock markets are viewed as places where people can transfer their ownership in corporations without any direct negotiations or contact to the other party of the trade. It is believed that the markets are efficient (efficient market theory) and that the price on the market is correct at any point in time. However, markets can serve their purpose only if they are liquid.

"It is generally accepted that liquidity, marketability or transaction costs are import attributes of assets which influence investors' portfolio decisions. Since investors care about expected holding period returns net of trading costs, less liquid (and more costly to trade) assets need to provide higher gross returns compared to more liquid assets." Datar et al. (1998).

Viewing liquidity as one factor in pricing a security in an investment decision is not far fetched. As discussed earlier fully liquid market is a market where transactions can be executed without a cost. Lack of liquidity can thus be viewed as a cost and thus the more illiquid the security / market the more an investor will have to pay transaction costs. Amihud et al (1986) proposed that investors are anticipating having to sell their security some time in the future. If a security is highly illiquid they recognize they will have to face transaction cost

at the time of the sale. "Enhanced liquidity lowers the cost of equity capital by reducing the compensation required by investor for trading difficulty." (Amihund et al. 1986). They also showed in their study that in equilibrium, illiquid assets would be held by investors with longer investment horizon (Datar et. Al 1998). Amihud et al stated that due to differences in liquidity considerable differences between securities values, on the same market, exists. Also Mashall (2005) concluded that "There have been many studies conducted on the issue that liquidity has been found to be a determinant of stock returns in large hybrid quote-driven market".

According to Amihud and Mendelson there has not been much attention paid to liquidity in asset pricing prior to their study in 1986. "The classical Capital Asset Pricing Model pays no attention to the effects of asset liquidity and investor holding periods on expected returns". Also many other studies refer to Amihud and Mendelson's study as one of the first to examine the role of liquidity in asset pricing.

Amihud et al. thus studied the effects of differences in liquidity on asset prices and expected returns. They found that expected return is an increasing and concave function of the bid-ask spread. This was tested on data within the NYSE, an organized stock exchange such as the Helsinki Stock Exchange most relevant to this study. They found that, after adjusting for risk, an increase of 1 percent in the bid-ask spread was associated with an additional monthly return of 0,21 percent.

"Overall the empirical relationship between return and liquidity in the large hybrid quote-driven markets of the US (the NYMEX, AMEX and Nasdaq) is well documented. Studies have found a negative relationship, confirming the existence of a positive liquidity premium as proposed by theoretical papers" (Mashall 2005). Since liquidity is studied in large markets, one could make the assumption that the theory might not hold with smaller markets, such as the OMX. Luckily Jun, Marathe and Shawky (2003) analyzed liquidity and stock market returns in emerging equity markets. Although the Finnish stock market can not be viewed as emerging market, the study is beneficial when viewing the behavior of those highly illiquid stocks at the Helsinki Stock Exchange. Jun et al. (2003) discovered a positive correlation between the aggregate market liquidity as measured by turnover ratio, trading value and the

turnover-volatility multiple. This positive correlation between stock returns and market liquidity is consistent with the findings in developed markets, implying that the theories of the "large markets" can also hold for smaller markets.

Lack of liquidity has also been blamed for the stock market crash of October 19th, 1987. "In dramatic language, the Brady Report painted a picture of enormous waves of institutional selling driving down prices excessively. The report claimed that such sellers suffered from an "illusion of liquidity"." Genotte and Leland (1990). The market had appeared to be liquid in terms, that until then, there had always been bid ask spread maintained. When the institutional selling begun, market makers and investors shifted their bids downwards to match the increased selling. As more selling appeared the bids came even lower and thinner since there was real uncertainty at what price the stocks could be sold again. This drove the market down as the amount of buyer was diminishing and the number of sellers increasing.

2.3 How to measure liquidity

As part of this study is to discover whether market making improves liquidity, it thus important to discuss the different ways one can measure it. There are a number of studies on measuring liquidity over different exchanges and asset classes. However, most of the studies done have not been able to agree on one measurement and the accuracy of it.

One of the first ones to use the quoted bid-ask spread as measurement for market liquidity and test the relationship between stock returns and liquidity were Amihud and Mendelson in 1986. According to Amihud et al. a natural measure for the cost of liquidity is the bid-ask spread. They argued that expected returns are an increasing function of bid-ask spreads. "If investors value securities according to their returns on net of trading costs, then they should require a higher expected return for higher spread stock in order to compensate for the higher cost of trading. " Thus there is a direct link between liquidity and corporate cost of capital. "They showed that in equilibrium illiquid assets would be held by investors with longer investment horizons. As a result of this horizon clientele, they argued, the observed asset returns must be an increasing and concave function of the transaction costs" (Datar et al. 1998). Amihud et al

(1989) were able to discover evidence on the liquidity premium, relating to the bid-ask spread.

However, subsequent empirical evidence in support of liquidity is somewhat mixed. Eleswara and Reinganum (1993) examined the same period and Amihud and Mendelson using the same proxy for liquidity. However, this time they found that the association between the bid-ask spread and the stock returns were mainly applicable to January (Datar et al. 1998). This was contradicted Brennan and Subrahmayam in 1996, who segregated the cost of transacting into a variable and fixed component. They found no seasonality in liquidity premium, but found some evidence in favor of the Amihud and Mendelson model. "In particular B&S find the concave relationship between asset returns and transaction costs with respect to the variable cost component. However, they did not find it with respect to the fixed cost component, which is inconsistent with A&M's horizons clientele effect. In summary, the question whether liquidity affects asset return or not remains unsolved thus far" (Datar et al 1998).

The discussions are about the lack of order based measures, measuring the liquidity trough bid-ask spread, while it doesn't take into account the depth and volumes of the market. According to Bernstein (1987) on of the most intuitive means would me to divide the dollar volume of trading day by average absolute percentage change on price – which he continues "is, in fact, the most popular measure of liquidity used in use in the marketplace.

Maybe the inconclusive studies on the return-spread relationship led to the development of other proxies for liquidity. One another commonly used proxy for liquidity is the turnover ratio. There are several different types of formulas derived from the basic turnover. "Turnover rate is defined as the total (dollar) value of the trading in a stock over a given period by market capitalization" (Marshall 2006). One reason for the popularity of turnover as measure could well be the simplicity and availability. Data on turnover is reported regularly (usually at least daily) and it is easy to access, where as bid-ask spread during the trading day can be hard to obtain at least for a longer time period. This enables studies to capture variations in liquidity of assets across large number of stocks over long period of time.

Haugen and Baker (1996) found a statistically significant negative return-turnover rate relationship for stocks that were part of the Russell 300 stock index, meaning higher returns

for less liquid stocks. Datar et al (1998) confirmed this in their study with NYSE and Nasdaq stocks. They investigated the relationship after also controlling for the firm size, book to market ration and the firm beta. They also excluded outliers by disregarding the lowest 1% and highest 1% observations of turnover rate. Their findings also supported the predictions of the Amihud et al (1989) by finding that stock returns are decreasing function of the turnover rates. However, in contrast to the findings of Eleswarapu et al. (1993), they did not find any evidence supporting the January seasonality.

It would seem that the number of different liquidity measures is greater than the number used by papers testing the relationship between return and liquidity. Aitken and Winn (1997) report that there are some 68 extant measures for liquidity used in literature. They also report that there is little or no correlation between many of these metrics.

Marshall (2006) argued that although liquidity has been found to be a determinant of stock returns in large hybrid quote-driven markets, the relationship between return and liquidity in small pure order-driven markets is less clear. Different proxies have produced different and conflicting results. Since Helsinki Stock Exchange is rather small, order driven market the findings of Marhall are highly relevant. Marshall used Weighted Order Value in his studies examining the return-liquidity relationship at the Australian Stock Exchange. WOV combines bid and ask depth and weights orders in the order book by the probability that they will be executed. His findings were consistent with the findings of previous studies as he indicated the existence of a positive liquidity premium, i.e. investors need to be compensated with higher return to hold less liquid stocks.

An interesting (side)notion about liquidity is that there is no hedge for it. "While an investor can reduce security risk by holding a diversified portfolio or by hedging into capital market, there is little he can do on his own to avoid cost of illiquidity". Amihud et al (1986). However, according to Amihud et. Al "a longer holding period thus reduces the amortized transaction cost per unit of time. A related consideration is the probability of the investor having to sell the stock before the end of his holding period. The lower this probability the lower the required compensation for liquidation costs included in the stock."

In addition to the return relationship, we will now discuss few other proxies for measuring liquidity.

2.3.1 Bid-Ask Spread

In the early studies bid-ask spread has linked to the existence and magnitude of dealer / specialist costs. It has been presumed that given a competitive environment spreads will be greater the greater the cost to dealer / specialist providing immediacy seen as a cost (Cohen et al 1979).

Since the late 80's the view of the bid-ask spread has changed some. Although it still seen as a cost, it not viewed so much as cost of the market maker / specialist but a cost of transacting, and according to Fleming et al. the bid-ask spread is a commonly used measure of market liquidity.

As stated earlier, one of the first studies to discuss this is Amihud and Mendelson (1986). They used bid-ask spread as a proxy for measuring liquidity, as have done many other studies (Eleswarapu and Reinganum (1993), Brennan and Subrahmanyam (1996)). "Illiquidity can be measured by the cost of immediate execution. An investor willing to transact faces a tradeoff: he may either wait to transact at a favorable price or insist on immediate execution at the current bid or ask price. The quoted ask price includes a premium for immediate buying and the bid price similarly reflects a concession required for immediate sale. Thus, a natural measure of illiquidity is the spread between the bid and ask prices, which is the sum of the buying premium and the selling concession. (Amihud et al 1986).

Fleming (2003) has the same opinions and according to him bid-ask directly measures the cost of executing a small trade, the cost being the spread. "It's advantages are that it can easily be calculated and data is widely available". (Fleming 2003)

However, using bid-ask spread to measure market's liquidity trading might not be entirely true. It would exclude the fact that the spread might also be a product of informed trading. Wu (2003) studied the information flow, volatility and spreads of infrequently traded Nasdaq stocks. He found that the proportion of information-based trading is negatively correlated with trading activity. "Infrequently traded stocks generally have a higher percentage of informed trading than frequently traded stocks. The result of cross-sectional spread regression show that effective bid-ask spreads are a positive function of the percentage of informed trading". Since all of the shares at OMX with market making can be categorized as infrequently traded stocks, bid-ask spread might not be the best measurement, if just comparing with other companies. However, since the main objective of this study is to define the possible effect of market making on a stock's liquidity and since one of criteria for the market makers is a set bid-ask spread, we will use the spread as a proxy.

Like in many other cases, there are also those who disagree about using the bid-ask spread as a measure. Brennan et al. (1996) discuss the return-illiquidity relationship and how to measure it. They argued that bid-ask spread is a noisy measure of illiquidity as many large trades occur outside the spread and many small trades occur within the spread. This is rather good point, and is often to be seen with the trading of illiquid shares. The market price of the share is not necessarily the trade price as with illiquid shares, larger volumes are traded outside the spread to compensate for the illiquidity of the share. Thus the bid-ask spread does not reflect the liquidity of the share. Also, the downside of just measuring the spread is that the quotes are valid for only a small moment in time and the volumes behind the prices can be small. We will thus discuss other measures of liquidity.

2.3.2 Depth

In addition to just looking at the bid-ask spread it is also important to take one step further and look at the depth of the order book. The amount of shares than can be traded at the bid-ask spread will give indication of the market liquidity. As discussed earlier, this combined with the bid-ask spread should give an indication of market's liquidity.

The importance of market depth to the liquidity can be easily thought in the following: when the number of shares to be sold increases in an illiquid market, the depth of the market describes how much lower price is to be asked, i.e. what is the price concession a seller has to give in order to sell the shares. Thus, when purchasing larger quantities of illiquid stocks, the investor might end up paying over the asking price if the depth of the market is not good and the number of share available at the market price is less than the buyer needs. In most cases with illiquid Finnish shares, the prevailing bid ask prices offer only up to few thousand shares.

2.3.3 Volume

Trading volume would intuitively seem like a valid proxy for market liquidity. One could make an assumption that the more certain stock is traded, the more liquid it is. However, can it be used to measure the liquidity of one individual share? According to Fleming (2003) trading volume is an indirect but widely cited measure of market liquidity.

According to Gopinath et al (2001) public market wide information drives the trading volumes of larger companies. However, for small companies the price reaction to the information occurs without perceptible increase in trading volume. This would mean that prices can change even in the absence of trades for small companies as market makers adjust their quotes in response to price changes of large companies or index movements. "another implication of this explanation is that when trades of small firms do occur, it is mostly because traders are acting on the basis of firm-specific information. They propose that the effect of trading frequency on bid-ask spread is conditioned to the firm size. They also found that empirical studies of market microstructure using volume as an explanatory variable for return volatility have substantially underestimated the effect of asymmetric information. Thus the problem with measuring liquidity using volume as proxy is that, that volume can be decomposed into informed and liquidity components. If it was to be used as a proxy, these should be separated to account for market liquidity and for trading based on some new information.

2.3.4 Trading frequency

Jones, Kaul and Lipson (1994) studied the effect that trading frequency has on the stock. Trading frequency does not include trade size, but merely measures the number of trades done within a specified interval. Alone it can thus not be a very accurate proxy for liquidity.

2.4 Liquidity and price volatility

Price volatility is an important factor in portfolio management since it is a measure of risk involved in the underlying asset. Liquidity plays an important role in the return volatility process, as clearly price volatility is a product of proxies used to measure liquidity. In addition to just the clear relationship between bid - ask spread and price volatility (a product of the bid –ask spread) also trading volumes, number of transactions and of course the market volatility are all accountable in the process. Many studies have been done on the subject, finding a positive relation, or an association, between asset liquidity and volatility.

"Increased volatility often lowers liquidity, because market markers require a higher compensation (reflected in the bid-ask spread) for taking a position in the volatile assets. The opposite implication may also hold; for an illiquid asset, an unexpected imbalance in the order flow can cause large price changes." Amihud et al (1989). An unexpected order imbalance would force the market maker to adjust his bid –ask spread to compensate for the increased risk. This will be discussed later in the study in respect to a market maker's function in providing liquidity and whether or not the operation is effective.

However, although as discussed above, high volatility can be viewed as lowering liquidity by presenting higher risk, there are notions for limiting it too much. For example, most market places have different restrictions on trading, trying to control the possible unwanted volatility, such as restrictions on daily price fluctuations. According to Amihud et al (1989) these kinds of restrictions might not desirable if set too strictly. For example; "a rule limiting daily price changes to 1 % might reduce volatility, but the liquidity of the market is likely to suffer because whenever the rule is binding, market participants are unable to execute mutually

agreeable trades. In such a case trying to reduce the volatility would lead to drop in liquidity at the cost of market efficiency.

Amihud et al. (1989) state that if the objective of a market is to reduce volatility while increasing liquidity and keeping asset prices informative, the trading system should reduce the friction in the market. It should be designed to reduce the noise variance without altering the underlying return variance resulting in lower price volatility, higher liquidity and more informative prices.

Explanations such as the inventory explanation and information asymmetry explanation of spreads have found a positive relationship between spreads and volatility (Stoll 1978, Amihud et al 1989). Infrequently traded stocks tend to have higher variations in order flow and as these stocks are traded, there is a higher probability that informed traders may act on private information, causing higher return volatility and widening of the bid-ask spreads by market makers to compensate for their potential loss to informed traders. (Wu 2004).

Since most of the stocks that have market making agreement at the OMX are rather illiquid it should be noted that the price of infrequently traded stocks is more sensitive to informed trading than that of frequently traded stocks. This suggests that information arrivals have a larger impact on price movements of infrequently traded stocks.

2.5 Liquidity at the HSE

OMX is a Nordic group consisting of the stock exchanges of Denmark, Finland and Sweden. In September 2006 the Nordic OMX Group launched a new Nordic market, with new market models. Instead of the traditional national lists, the list of Finland, Sweden and Copenhagen have been combined and sorted according to market size. New list are large, mid and small cap lists. Before and after launching the new lists, there have been discussions in the Finnish media that introducing such a large number of new companies to Finnish investors could decrease the interest in small, Finnish companies. This could lower the already low liquidity and trading volumes of small companies.

However, since this study is focused on the time before September 2006 it is beneficial to look at the liquidity in the previous years at the Helsinki Stock Exchange. Before the introduction of a new Nordic list, the HSE had 128 different stocks listed, with 120 different companies. Some companies had thus 2 different series listed on the exchange dividing the trading volumes even more. In most cases, the other of the shares is highly illiquid with more voting power and extremely low free float.

Stocks were separated to different lists, which were the main list, NM-list and I-list. 85% of the all shares were traded on the main list. Stock trading volumes at the Helsinki stock exchange were 144 708 mil. Euro, 181 161 mil. Euro, 224 960 million Euro, and 231 571 million during years 2003-2006 respectively. The total trading volume of the five most traded stocks amounted up to 126 094 mil. Euro year 2003, 149 575 mil. Euro year 2004, 162 480 mil. Euro year 2005 and 201 478 million Euro in year 2006. These figures show that the 5 most traded shares totaled 87%, 83%, 72% and 86% of the total annual yearly trading volumes respectively. As the figures clearly indicate, the trading volumes of the remaining 115 companies are low, creating a number of highly illiquid shares. This study will focus on that period in history as not enough data is available on the new Nordic list.

3 MARKET MAKING

3.1 Definition

Market maker is a company, which quotes bids and asks in a financial instrument of commodity. "A market making service is performed when a broker-dealer is willing to put its capital at risk to facilitate the completion of trades by others" (Smidt 1971). Although the function of a market maker is common, the operations of market makers can vary with the stock exchange. This study is mainly focused on the market making at the Helsinki Stock Exchange (HSE). Since most studies are based on the main exchanges such as the AMEX, NYSE, NASDAQ and LSE this study will focus on market making in general and later discuss market making at the OMX

In some cases market maker is also referred to as a specialist. A Specialist (for example at the NYSE) is by function a market maker, as is liquidity provider. To avoid possible confusions among readers, term Market Maker (MM) refers to a company that provides bid-ask quotes for securities. LP stands for Liquidity Providing contract at the Helsinki Stock Exchange (nowadays OMX).

3.2 Market Maker's function

The bid-ask orientated literature recognizes that the arrival of random buy-and-sell orders tenders is no synchronous, and as a result perceives that a demand exists for immediacy providers who will service buy orders at somewhat higher price and sell orders at a somewhat lower price. Hence market makers have been viewed as the suppliers of immediacy and the bid-ask spread generally has been viewed as the price they impose. (Cohen et al. 1979)

Objective of market makers is thus to guarantee a certain degree of liquidity in a security by setting bid and ask quotes even when other investors / traders are not present in the market. They are supposed to maintain market presence and assure price continuity. As discussed

earlier in section 2 the lack of liquidity is a cost that the investor will need to carry. Market makers, as a provider of liquidity, should decrease the bid-ask spread and thus decrease the cost of transacting.

The performance and the effects of market makers have since long been under different studies. According to Smidt (1971) the main economic criterion relevant to evaluating the performance of market-making system is the extent to which it supplies liquidity in depth to offset temporary imbalances in supply and demand.

Most literature recognizes two different types of investors on the market. There are those who trade purely on volume, i.e. do not make a decision on to invest on the stock by having "information" on it, but are looking to buy low and sell high. The other type of an investor is information traders, who have some "correct" price for the stock. Black (1986) distinguishes between people who trade on basis of information and "noise trading", which is trading on noise as if it were information. "If there were no noise trading, there will be very little trading in individual assets. People will hold individual assets, directly or indirectly, but they will rarely trade them. " Black (1986). According Mr. Black an information trader is one who has information or insights about stocks and will take the other side of the trade. Now, if the one on the other side of the trade would be an information trader, this would have to be taken into account. Would the trade still be attractive to one side? "From the point of someone who knows what both traders know, one side or the other must be making a mistake. This is where noise trading comes into play. "Noise trading is trading on noise as if it were information. People who trade on noise are willing to trade even though from an objective point of view they would be better off not trading. Perhaps they think the noise they are trading on is information. Or perhaps they just like to trade" (Black 1986). As Black continues: "The more noise trading there is, the more liquid the markets will be".

However, if the opposite applies? If markets are very illiquid, the amount of noise traders is rather low. In the absence of noise traders the amount of trades will decrease as information traders will not find counterparties for trading. This is where the role of market makers becomes important. They will trade against information traders, providing liquidity to the market.

One good way of looking at the possible effects of market making has been done by researching intra-day patterns. There are several different studies on the subject, researching trading volumes, the bid ask spread as well as volatility. Many of these studies have found a U-shaped pattern on the market. McInish et al (1990) and McInish et al (1985) found in two different studies a high variance of returns at the beginning and at the end of the trading day. In addition, Foster et al 1990 found evidence on U-shaped pattern in the intra-day volumes. This implies that the spreads are at the highest right after opening and before closing. This was also studied by Abhyankar et al (1997) who studied the spreads, volume and volatility on intra-day patterns from the London stock exchange. Their findings were consistent with the previous findings: clearly a U shaped pattern in the bid ask spread and also in the return volatility. His results suggested that "the bid-ask spread is higher during the two "windows" when the market is open but market markers are not obligated to post quotes i.e. outside the Mandatory Quote Period" (Abhyankar et al 1997). This would indicate that market making has had an effect on the market behavior, decreasing the spreads and volatility, thus implying the effectiveness of it.

3.3 Market making internationally

As already discussed in the previous sections, market making, or the function of "specialists" has been studied in many ways previously. Most studies have focused on larger international markets, where different model appear.

With "old", traditional market models, such as the NYSE, market makers have enormous amount of information relating to the order flows of shares. I.e. they are in between transactions managing their inventory. NASDAQ market makers use their own capital, research and resources to represent stock and compete with each other to buy and sell stock they represent. There are over 500 firms acting as market makers in the Nasdaq-market.

Chung and Zhao (2004) studied the quote revision behavior of Nasdaq market makers. They studied in addition to just how price quotes change, how the depth quotes of the market

makers change over time. They discovered that market makers change depth quotes more frequently than spreads. They found that nearly 70% of all revision involves changes in the depth, where as only 57% of quote revisions involve changes in the spread.

Ho and Macris (1985) argue that increasing the number of market makers in a security would improve the depth of the market. The reasoning behind this is that when only one market maker is present, it has the possibility, without the competition of other market makers to use the bid-ask spread to recover the cost of market-making. When many market makers compete for the trades, they would keep the spread same, just adding quotes (depth) on the market. With the absence of other traders, a market maker can adjust the location of the spread midpoint in its favor. For example, if the market maker has a short position in the stock, acting alone he or she can raise prices, encouraging potential sellers / discouraging buyers.

There are arguments supporting one market maker as well as multiple market makers. The collective ability of dealers to carry inventory to absorb imbalances in buying and selling activity is much higher (Anand 1990). On the other hand Glosten and Milgrom (1985) found an advantage in a specialist, i.e. one market maker system. They found that there can be instances where competing market markets will not quote, as all of them expect to lose money on a trade. The situation is likely to remain the same until new information is disclosed to the market. In a case of a monopolistic market maker, they argue, this is not the case. By keeping the market open, i.e. allowing a spread, the market maker could learn some of the information of the informed.

3.4 Market Making at the Helsinki Stock Exchange

Until the year 2004 market making had been common in Finland mainly on Finnish derivatives. Stock market making (liquidity providing) is relatively new service and before year 2004 only few companies on the I-list used the service. At the beginning of LP-service there were no set criteria for the market maker. This changed in April 2004 when the Helsinki Stock Exchange introduced LP- liquidity providing service for listed companies. The model followed that of the Stockholm Stock Exchange. The stock exchange itself does not provide

liquidity, but instead it provides the framework and closely monitors that market makers fulfill their obligations. Before actually becoming a market maker, the broker-dealer must first apply to be accepted as a market maker at the exchange. After receiving acceptance the market maker can enter into an agreement with a company to provide liquidity for that company's share traded at the stock exchange.

Market making at the Helsinki Stock Exchange (HSE) is some what different than in major stock exchanges around the world. At HSE the market maker has its quotes on the trading system all of the time, where as f.ex. at NYSE the investor contacts the market maker for a quote on a block of shares separately. This is of course mainly due to the electronic trading platform available at HSE. What differs probably most are the requirements for the market makers - more specifically, the amount of shares that needs to be quoted.

Before the combined Nordic List and the removal of trading lots (September 2006) the quoted lot at HSE were relatively small, in most cases 400 to 2000 shares. The requirements were drawn upon experiences from the Stockholm Stock Exchange. The market maker was obligated to quote at least 4 trading lots with 4 % spread or better.

In September 2006 as trading lots were withdrawn from all the exchanges belonging to OMX, and the exchange had to set new criteria for market markets. With the new rules, the market maker will have to set quotes for number of shares equal to 4000 euros on the bid and ask side. The spreads have remained the same. However, the market making agreements that were in place before the removal of trading lots will not be changed. Thus in some cases the Euro amount quoted is less than 4000 Euro, in some cases even less than 1000 Euro. Since OMX only provides the minimum requirements for the spread and size of the quotes, the company and the broker can agree on tighter obligations. In most cases, before entering into the agreement with broker-dealers, most companies have agreed on larger lots and better spreads.

It is safe to say that market making at HSE, nor at the OMX were created for institutions, as the requirement lot sizes are still very small for larger investors. However, for illiquid stocks a

market maker could improve the situation as an institution can contact the market maker and ask for a quote for a larger lot of shares.

Also a difference with NASDAQ, LSE and HSE is that the first two have a market making system of multiple market makers. NASDAQ, for example, has a structure of competing market makers, where each market maker competes for customer order flow by displaying buy and sell quotations for a guaranteed number of shares (NASDAQ). LSE has always at least two market makers on each stock (LSE). Although there are multiple market makers at HSE; they are not market making for the same companies.

3.4.1 Situation today

There are currently 34 securities with Liquidity Provider- agreement trading on the Helsinki Stock Exchange. The popularity of market making has not vanished although few companies have terminated their liquidity providing contracts. 10 new companies have signed the agreement during the later half of 2006 or the beginning of 2007.

There are currently 6 active broker / dealers acting as stock market makers on the Helsinki Market. These are (in order of for how many shares they are making the market): Nordea Bank Finland Plc, FIM Securities Ltd, Kauthing Bank Oyj, EQ Bank Ltd, Remium AB and Opstock.

As the companies can negotiate the amount of share to be quoted, they vary very much. The minimum quoted lot, according to the old rules, is 400 shares and according to the new rules 4000 Euro. Currently the volumes vary from 400 to 20000 shares.

3.5 Motivations for Market Makers

Since market making does involve effort and risk to the broker / dealers, acting as a market makers it should also provide some kind of reward. "Market makers earn their income in two ways: by managing order and by assuming risk" (Demsetz 1986)

3.5.1 Reward

One direct reward in the Finnish market making agreement is the annual fee paid by the company of the underlying share to the market maker. Since there are several liquidity provider companies, which compete with each other, the fees paid by the companies are not disclosed to the public. According to the head of Derivatives at FIM Securities Pekka Ollikainen[1], the fees are not substantial and are within of thousands of euros. The fee received is thus not the main motivation for the market maker as the price risks in the underlying share can easily amount to that. Why would then a market maker enter into a such an agreement?

One possible explanation is pure visibility. The more a market maker provides liquidity, the more visibility the brokerage company gets. Also by trading daily on the share, the market maker has a better view of the share, i.e. its volumes, who is buying/selling or what the trends are. This increases the knowledge the market maker has over the stock and will help with trading.

As already discussed earlier, the market maker will also try to manage his inventory and try to collect his reward with the bid-ask spread, i.e. selling high and buying low.

[1] Interview 14.3.2006

3.5.2 Risks

Market makers face two different costs in addition to the processing cost of trading the stocks. As we already pointed out in the earlier section, the bid-ask spread should cover the processing costs of doing business. However, there are two additional costs of market making that must also be reflected in the spread. Amihud and Medelson (1980), Demsetz (1968) Ho and Stoll (1983) and Stoll (1978) emphasized the inventory holding costs of liquidity suppliers, where capital is tied to buy the shares. If they are not sold quickly, the market maker occur a cost as capital is tied to a non-interest paying asset.

Copeland and Galai (1983), Easley and O'hara (1987) and Glosten and Milgrom (1985) concentrated on the adverse selection costs faced by liquidity suppliers when traders are involved. This cost, more of a risk, is of course the change in the price of the underlying asset. If a market maker is unable to sell the asset further, or has to sell it at a lower price, he would incur a loss. This is why market makers usually do not take long positions, but try to manage their inventory so that the individual (and market risk) is low.

The latter risk can be thought with an example where the market maker is the only seller in a rising market. If the market maker is not careful, the risk of short selling exists. Of course most market makers have inventory and thus are not naked short on the stock. In such a case the market maker would borrow the sold stock and little by little try to buy the shares back, with the intention of not increasing the price. If the market maker is not able to borrow the shares and the trades have to be settled, he will have to buy the sold shares from the market. If no sellers exist, the market maker will drive the price of the share up, at the same time losing more and more.

3.6 Motivations for the company

Since this study is mainly focused on market making at the OMX, we will only discuss motivations applicable to those companies traded there, especially at the Helsinki Stock Exchange. Having a market making agreement for the company's share is not free for the

company. Although the cost is rather low annually there has to be something to be gained for this fee. In the following we will look at some situations and motivations when and why companies have decided to get a market maker for their share.

It seems that companies that have signed a liquidity proving agreement have many similarities. The average daily turnover on the company's stock has been and in most cases still is rather low. According to the Head of Finance[2] of Lännen Tehtaat Oyj, one of the purposes was to increase the daily trading volumes and make sure that there are no days when zero stocks are traded. The stock of Lännen Tehtaat Oyj had had many zero trading days in the past and as the bid-ask spread was over 5% many investors felt that the stock was too illiquid.

Most important motivation is of course to make the price formation more accurate. As already discussed, better liquidity enhances efficient price formation and thus lowers the compensation required by the investor for trading difficulty. This could raise the price of the stock.

One reason that has nothing to do with the value of the stock or the volatility is the motivation to expand the investor base of a company. Since market making at the OMX is mostly for retail investors, this might be a logical way of thinking. In cases where larger amounts of the share are owned by institutions as "long term investments", or where the free float is rather low for other reasons, the trading volumes can be rather thin. As more retail customers start owning the share, more trading action should arise in the share. As discussed earlier investors might not be willing to invest in a company if the exit cost is great. With a market making agreement, the investor knows that selling of the shares is possible without having to pay too high illiquidity premiums or having no way to exit the investment.

Even if the company would not want to enlarge its investor base, but has a limited free float, having a market maker would support the valuation of the company. With a low free float, there are not many real buyers or sellers on the market, making it hard for anybody to trade

[2] Telephone discussion with Mr. Hannu Hovi, Head of Finance 7.11.2006

with the stock. With a market maker, the company can be sure that its small/retail investors are always able to sell or buy the company's share no matter what the free float.

One, a bit far fetched, motivation could also be that when the market making commences, the broker acting as the marker will start analyzing and selling the company as investment opportunity to its clients more. This however, is only speculation since according to Finnish Financial Supervision (and also international financial authorities) the analyzing department must be independent unit, which doesn't give out recommendations based what the broker / sales department wants, but based on accurate data and measures. However, according to public discussions on a website of Finnish paper for investors, the commencing of market making shows that the market maker views the company as good and with potential (www.arvopaperi.fi). This might not be entirety false either. There is evidence that activities of brokerage house analysts increase liquidity (Brennan et al 1995).

3.7 How to measure Market Makers?

A number of different studies have been done on specialists and market makers and how to measure them correctly. As discussed earlier, there really is no one correct measure or proxy for liquidity. The same thing applies to measuring market making.

According to Barnea (1974) who analyzed the behavior of New York Stock Exchange Specialists and developed criteria to assess their market making efficiency, the first to bring major insights into the economics of market making was Demsetz. "He considered brokerage commissions and the market makers bid-ask spread as the two elements comprising all NYSE transaction costs. An implication of his analysis is that the appropriate criterion for evaluation the efficiency of the market maker is the size of the bid-ask spread after adjusting for some characteristics of his stock" (Barnea 1974).

Demsetz found that the share volume, average price, number of competitive market makers and risk are the most important characteristics that affect the bid-ask spread. The question of whether the size of the spread is the relevant variable on which specialists should be evaluated

was discussed by Smidt (1971). He concluded that for an investor selling when a temporary excess of supply prevails in the market, the size of the spread is of no relevance. For him, the important aspect of the specialist's activity is the extent to which the specialist reduces his bid price because of the temporary supply imbalance. Barnea (1974) pointed out that, the implication of Smidt's thoughts is that specialists are thus not just users of price data generated by that process, but actually participants in the price discovery.

Barnea (1974) on the other tried to construct a performance criterion for the New York Stock Exchange Specialists and to their ability to affect price variability. According to Barnea, "the price-setting behavior of the specialists, at times when trading imbalances prevail in the market, is the most important aspect of their performance"

Combining most elements of liquidity Smidt (1971) suggested three main criteria for evaluations. He suggested that market makers (in his case specialists) should be evaluated by looking at the bid-ask spread, continuity and liquidity in depth.

4 HYPOTHESIS

This study examines if the commencement of market making has any effect on the stock liquidity. We look at stocks traded at the Helsinki Stock Exchange (part of the OMX Group), which have signed a LP-agreement. Since the main objective of a market making is to add liquidity to the market by offering bid and ask quotes, the hypothesis of the study is that market making agreement has an effect on stock's liquidity and on the bid-ask spread. As discussed in section 2. there are many measures for liquidity. In this study, we will test the hypothesis by studying the intraday bid-ask spread, its volatility and turnover.

Also, following previous argument, the hypothesis follows that if liquidity is increased, the price of the stocks should rise. Investors should require a "risk premium" for holding an illiquid asset, thus keeping the stock price lower than (more liquid) peers. As the stock becomes more liquid the premium should be smaller, thus increasing the stock price after the market making has commenced.

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5 DATA AND METHODS

5.1 Data Description

The data used in the study consists of two different data sets. First, for the measurement of intraday bid-ask spread and the standard deviation of the spread, we use intraday data obtained from Helsinki Stock Exchange. The data consists of intraday bid – ask quotes for each of the underlying with 15 minute intervals for the whole trading day. The data set was available for 40 days prior to the commencing of market making and 40 days after. In cases where the range of the data was not sufficient for the underlying to be included in the average calculations, the underlying is left out of the average intraday calculations.

When calculating turnover, stock performance or volatility, daily data is used. This data consists of daily trading volume (number of shares) and closing prices. It has been obtained from the Helsinki Stock Exchange web-pages or such data vendors as Reuters and Bloomberg.

Table 1 exhibits the underlying used in this study as well as the data ranges for intraday measurements as well as for daily data range.

Underlying	Trading Code	Commencing of LP	Intraday Data Range	Daily Data Range
Aspocomp Group Oyj	ACG1V	1.4.2005	1.2.2005 - 1.6.2005	3.10.2004 - 28.9.2005
Atria Yhtymä Oyj	ATRAV	4.4.2005	4.2.2005 - 2.6.2005	6.10.2004 - 1.10.2005
Compnenta Holding Oyj	CTH1V	4.1.2005	4.11.2004 - 4.3.2005	8.7.2004 - 3.7.2005
Cencorp Oyj	CNC1V	3.1.2006	3.11.2005 - 3.3.2006	7.7.2005 - 2.7.2006
Efore Oyj	EFO1V	2.11.2004	2.9.2005 - 2.1.2006	6.5.2004 - 1.5.2005
Etteplan Oyj	ETT1V	21.12.2004	21.10.2004 - 21.2.2005	24.6.2004 - 19.6.2005
EVI1V	EVI1V	13.6.2005	13.4.2005 - 12.8.2005	15.12.2004 - 10.12.2005
Honkarakenne Oyj B	HONBS	29.10.2004		2.5.2004 - 27.4.2005
HK Ruokatalo Oyj	HKRAV	6.6.2005	6.4.2005 - 5.8.2005	8.12.2004 - 3.12.2005
Julius Tallberg Oyj	JTKBS	29.10.2004		2.5.2004 - 27.4.2005
Larox Oyj	LARBS	2.9.2004		6.3.2004 - 1.3.2005
Lemminkäinen Oyj	LEM1S	5.10.2004		8.4.2004 - 3.4.2005
Lännen Tehtaat Oyj	LTE1S	14.11.2005	14.9.2005 - 13.1.2006	18.5.2005 - 13.5.2006

Martela Oyj	MARAS	1.11.2004				5.5.2004	-	30.4.2005
Rapala Oyj	RAP1V	3.1.2005	3.11.2004	-	3.3.2005	7.7.2004	-	2.7.2005
Raute Oyj	RUTAV	11.1.2005	11.11.2004	-	11.3.2005	15.7.2004	-	10.7.2005
Satama Interactive Oyj	SAT1V	9.8.2005	9.6.2005	-	7.10.2005	9.6.	-	7.10.2005
Solteq Oyj	STQ1V	4.11.2004				8.5.2004	-	3.5.2005
Tekla Oyj	TLA1V	1.8.2005	1.6.2005	-	30.9.2005	2.2.2005	-	28.1.2006
Teleste Oyj	TLT1V	1.8.2005	1.6.2005	-	30.9.2005	2.2.2005	-	28.1.2006
Waahto Group S	WAT1S	12.10.2004				15.4.2004	-	10.4.2005
Waahto Group K	WATKV	12.10.2004				15.4.2004	-	10.4.2005

Table 1: Stocks used in the study and their data ranges

It should be noted, that there are currently more companies with an LP agreement. Due to a change in the trading system of HSE, the range of the data varied by underlying and some of the underlying with LP had to be excluded from the study as not enough prior to LP data was available.

It is recognized that the sample used to study the possible effects of market making on individual shares is small. However, there are currently only 34 companies with market makers, which by itself alone would not be enough to make statistical conclusions. However, since this is the situation, the only option is to conduct the study with the given environment. .

We also use closing price and daily trading volume (number of shares traded) to measure possible abnormal returns over the period before and after market making. Also, in order to measure price volatility closing prices are used. For these measures some of the underlying that were excluded in the intraday spread study have been included. Also, in addition to using the time range of 40 trading days before and after the commencing of market making, we have also used a longer time period. Longer time period provides more measuring points thus creating reliable data. The longer time period consists of data of 6 calendar months before and after commencement of market making. As calendar month do not necessarily divide equally into trading days, the trading days used in the study have been equalized. In the original data ranges varied from to 122 to127 days before and 86 to 129 days after. Cencorp Oyj had only started its LP market making recently and thus has not enough data for the 6 calendar month measurements. It will thus be excluded from the measurements. 122 trading days is the

minimum amount of days that will allow the use of the other stocks and so it will be used as the amount of days before and after the commencing of LP for all stocks.

5.2 Description of methods

In order to measure the possible effects of market making, it is necessary to look at each definition of liquidity separately and by combining them.

To measure the effectiveness of market making on the bid – ask spread and the effective pricing, the study examines and compares intraday data 2 months before the commencing of market making and 2 months after. Study will look at the intraday spread and its volatility.

5.2.1 Bid – ask spread

We measure possible effects of market making using bid-ask spread as the proxy. As discussed earlier the spread is a transaction cost and one of objectives of market making is to reduce the spread in order to increase liquidity.

For each separate underlying the daily spread is calculated as an average of the intra day spreads with 15 minute intervals. Due to the illiquidity of the stocks in the sample, some of the spread data is insufficient. As in some cases during the day only bid or ask was available. It is argued that this does not mean that no-one would have been willing to buy or sell the shares at any price below (over) the ask (bid) price. The missing bid or ask has been inserted by using the maximum spread of that trading day multiplied by 1.10. It is thus assumed that counterparty had been found with the additional 10% premium on the spread.

This problem mostly occurred before the commencing of the market making, which could be explained by the fact that the criteria for market making calls for quoting 85% of the trading day. Should the market maker want to wait a few minutes to see at what levels the stock starts

trading, or if there are some news on the stock, the start of quoting might be delayed by some minutes, thus explaining the lack of quotes in the early trading session. This same phenomenon might also be visible just before the trading ends as market makers turn off their quoting machines few minutes prior to the end.

After calculations of individual spreads, the average of all spreads is calculated. The calculations are done so, that equal number of trading days before and after the commencing of LP are used for each of the underlying. If no data is available for an underlying (thus the range of the data has not been sufficient), the underlying was excluded from the calculations. There were 14 different underlying with 39 days prior and after commencing of LP that were used.

5.2.2 Volatility of bid-ask spread

In order to be able to sell the shares during any time of the trading day, it is important that bid-ask spread does not vary within the trading day nor from day to another. Liquid stocks, for example Nokia's share traded at the Helsinki Stock exchange has a spread that remains almost constant (at 0,01 Euro). The investor can also be sure that the lack of a bid/offer will not increase trading costs the following day, should he decide to sell/buy the shares.

We have first measure the intraday spreads as a percentage spread calculated from the bid price. After this a standard deviation of the intraday spreads, with 15 minute intervals, was calculated for each stock separately. We have then measured the day to day volatility of the bid-ask spread by looking at average of all daily standard deviations from time T-40 to T+40.

Again, the calculations are done so, that equal number of trading days before and after the commencing of LP are used for each of the underlying. If no data is available for an underlying (thus the range of the data has not been sufficient), the underlying was excluded from the calculations. There were 14 different underlying with 40 days prior and after commencing of LP that were used. It is the assumption of the writer, that if designated market

maker is functioning well, the standard deviation of the bid ask spread should decrease with the commencing of LP as the spread should be more stable.

In addition to looking at the average of the 14 stocks, we also look at the bid-ask spread volatility on each stock separately. This is again done by calculating the standard deviation of the spread over 15 minute intervals over the period of days before and after the market making.

5.2.3 Stock performance

Efficient pricing of an illiquid security can be difficult as investors want a risk premium for larger spreads: "Enhanced liquidity lowers the cost of equity capital by reducing the compensation required by investor for trading difficulty." (Amihund et al. 1986). If market making at the really increases stock liquidity and Amihud et al are correct in their theory, it should also be visible in the performance of the stocks in our sample. With the increase in liquidity, the stock price should increase as the risk premium by the investors for holding the asset lowers.

This will only give some insight on the possible price developments. If LP was to automatically raise the performance of the share (as stated earlier due to the increase in liquidity) there should be an increase across all shares at the midpoint of the data range (time T when LP commences). The rate of price change will be calculated from the closing prices, which have been rebased to a value of 100 at T-122. The performance of each stock will then be measured until T+122.

In addition, since the few past years have been very bullish at the Helsinki Stock Exchange the improvement in the stock performance alone does not insure that it is market making effecting the prices. We will thus compare the performances of the individual shares to a benchmark to see if a trend of abnormal performance really exists. We will use OMX Helsinki 25 index (previously HEX25) and the main index, OMX Helsinki All Share (previously HEX-index), to see if the performance of the share is really due to the trend. Each

stock is viewed separately against the respective performance of the indices. We will thus compare the movements on the stock with the movements on the indices on the respective days. The change in the closing price or value is calculated log normally ln(T/T-1) with all stocks and indices first rebased to a value of 100, which is the value at T-122, where T is the time when the market making has commenced.

OMX Helsinki 25 index consists of 25 most actively traded stocks on the Helsinki Stock Exchange and is a capitalization weighted, where maximum weight of one company is limited to 10 percent where as OMX Helsinki All Share includes all the shares listed on the Helsinki Stock Exchange. We recognize that it would be wise to compare the performance of the shares with other individual shares within the same sector or with the industry sector. However, due to the illiquidity of many of the comparable companies, we feel that comparison with main indices is the best alternative, as they present a better picture of the overall market situation. For example in consumer Staples, to which Atria Yhtymä Oyj and HK Ruokatalo Group Oyj belong, Kesko has the weight of 69% and represents (according to the opinion of the author) a different genre. In case of Tekla Oyj, we could compare the performance of Tekla with the Information Techonlogy Index. However, since Nokia represents over 92% of the index, it is just the same if only Nokia share is used. Again, in opinion of the author, comparing Tekla Oyj, which produces software for building companies and a mobile phone manufacturer will not improve the reliability of the study. In addition, we feel that indices are the indication of market trend, i.e. if the market is plain bullish or if the stock really outperforms in a bearish market.

Abnormal returns would merely indicate that one of the motivations for companies to obtain market making would hold. If the current liquidity does not reflect the current share price correctly and when this liquidity increases, the price should improve. This would be consistent with Amihund et al. who in 1986 argued that investors want a premium for less liquid stock. If this holds, expected returns should be negatively related to the level of liquidity.

5.2.4 Trading volume

As stated earlier in the study, one proxy for stock liquidity is simply trading volumes. To compare the trading volumes, we examine the volumes of 21 of the shares with a market maker.

We look at the volumes of 122 trading days before the commencing of the market making (T-122) and 122 after (T+122). We examine the possible change in the average trading volume (number of shares per day) as a total. The changes will be looked on individual stock separately. If the hypothesis holds, introducing a market maker should improve liquidity and thus increase trading volumes, conditional to the hypothesis that trading volume is a proxy for liquidity.

5.2.5 Price Volatility

As discussed earlier in the study, price volatility is an important factor in portfolio management. Due to this, possible evidence on volatility will be the second main objective of this study.

We measure the price volatility of each stock before and after commencing of market making by measuring the standard deviation of the stock price return for the two 122 day periods separately. The daily closing price is used to calculate the daily price fluctuations with the following formula: $\frac{\sum X_n - \overline{X}}{n-1}$ where n = T – 122 to T + 122. The standard deviation was then multiplied by yearly trading days equal to $\sqrt{252}$ to reflect the annual volatility.

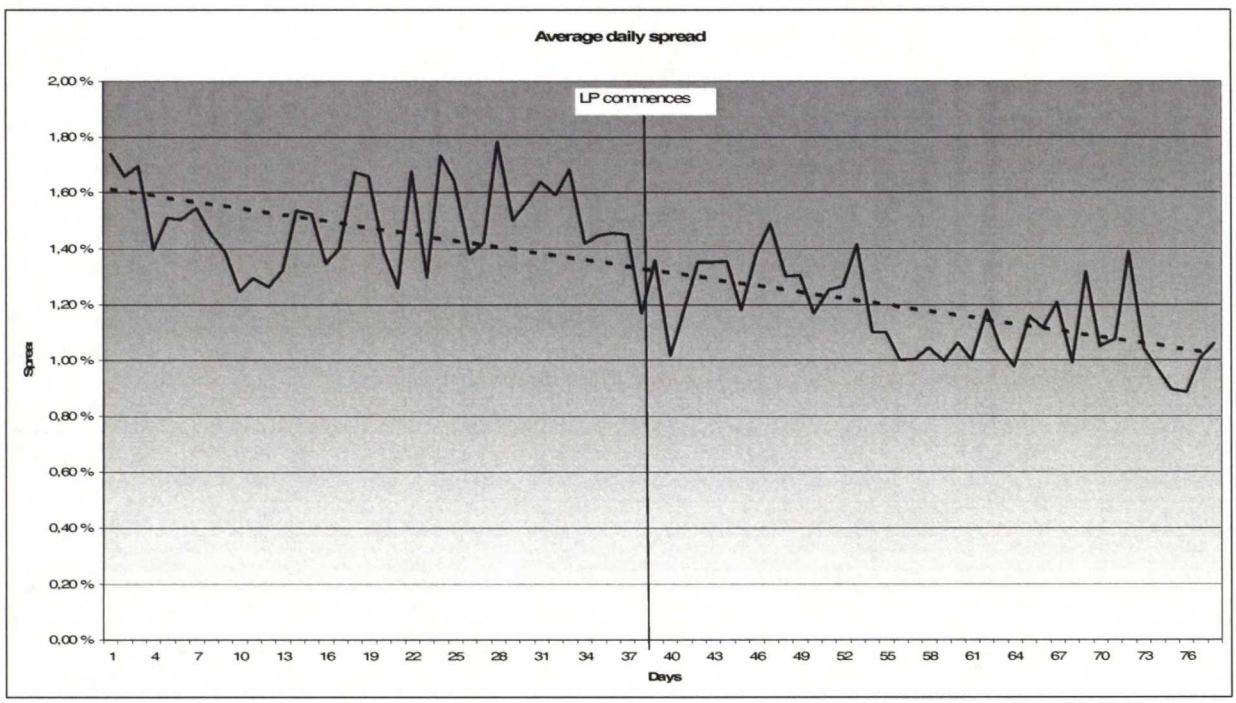
Market making of a share is thought to reduce stock price volatility as more liquidity is provided, by also increasing the depth of the market. However, since most of the stocks

analyzed are highly illiquid we expect to see some increase in price volatility due to lack of trades before market making.

6 RESULTS

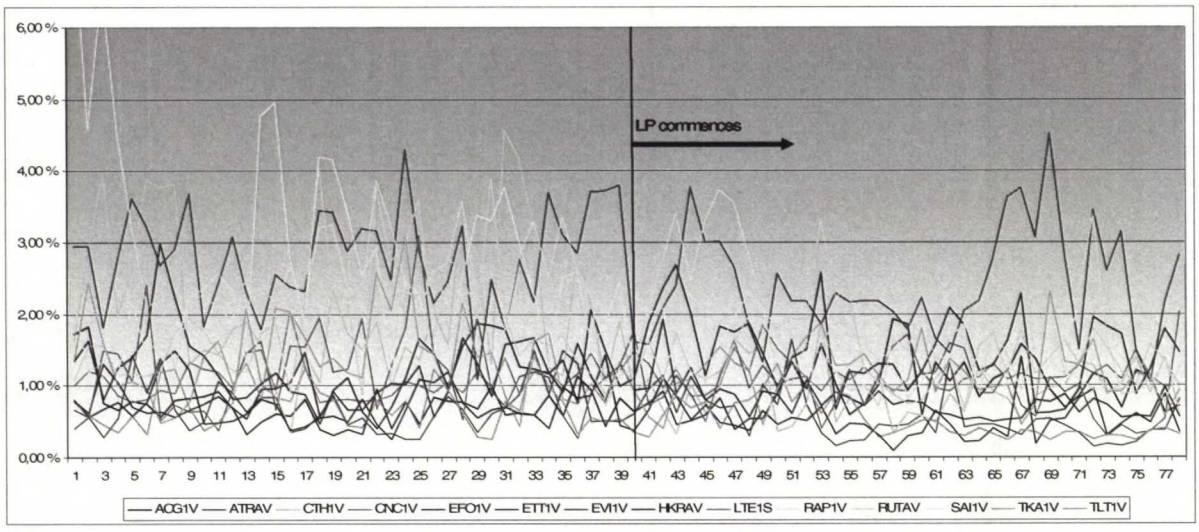
6.1 Spread

After re-setting all securities to reflect the same time periods, i.e. 40 days before the commencing of the market making and 40 days after we show that the average of average spreads had a reaction to the commencing of market making on the security. The average of the average intraday spreads fell from an average of 1.49 % to 1.15 %. This accounts for a drop of 23% on the spread.



Graph 1: Combined Daily Average intraday spread measured 40 days before and 40 after the commencement of market making.

If market making is supposed to lower the bid-ask spread, it should be visible across selection as a rule. Graph 2 exhibits the daily averages of bid ask spreads for each stock separately for the same time period. The commencement of Market making is indicated by an arrow and straight.



Graph 2: Average Daily intraday spreads measured 40 days before and 40 after the commencement of market making.

In most cases we can observe a clear improvement in the spreads, or at least the range of the daily average spreads is narrower. However, there is no clear lowering trend line in all of the stocks. In 3 cases the average daily spread increased after commencing of the market making. The best improvement was in case of Componenta Holding Oyj, where the average intraday spread fell from an average of 2,12 % to 0,91 %.

The individual spread details can be found at the table 3 below. As can be seen the maximum of average daily spreads were less than 4% in all cases except one after the commencing of the LP. This would indicate the maximum spread allowed for market makers at the HSE has not been violated. In one case (with the average maximum spread of 4,52%) based on the intraday data, the spread was high just before the closing of the market. Since market makers only have to quote 85% of the trading day, a spread larger than allowed for market makers was to be expected. Before the market making had commenced, the maximum average spread had been rather large, up to 7,6 % as in case of Rapala.

Spread	ACG1V		ATRAV		CTH1V		CNC1V	
	Before	After	Before	After	Before	After	Before	After
Minimum	0,32 %	0,40 %	0,25 %	0,15 %	0,36 %	0,32 %	0,78 %	0,85 %
Maximum	1,84 %	1,93 %	1,49 %	1,65 %	4,57 %	1,88 %	2,05 %	1,84 %
Average	0,74 %	0,96 %	0,70 %	0,56 %	2,12 %	0,91 %	1,08 %	1,16 %

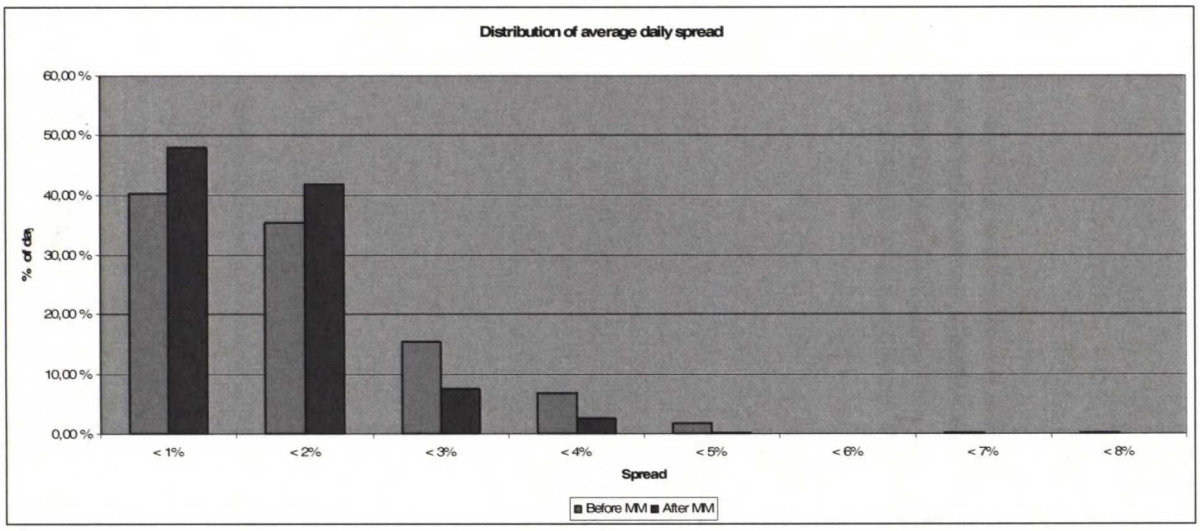
Spread	EFO1V		ETT1V		EVI1V		HKRAV	
	Before	After	Before	After	Before	After	Before	After
Minimum	0,54 %	0,50 %	0,41 %	0,62 %	1,09 %	1,04 %	0,26 %	0,10 %
Maximum	1,67 %	1,92 %	2,99 %	2,69 %	4,31 %	4,52 %	1,49 %	1,40 %
Average	0,98 %	0,79 %	1,28 %	1,49 %	2,82 %	2,39 %	0,74 %	0,53 %

Spread	LTE1S		RAP1V		RUTAV		SAI1V	
	Before	After	Before	After	Before	After	Before	After
Minimum	0,28 %	0,30 %	0,72 %	0,72 %	0,88 %	0,68 %	1,12 %	0,82 %
Maximum	3,09 %	2,02 %	7,69 %	3,74 %	4,03 %	3,32 %	4,96 %	2,30 %
Average	1,18 %	1,00 %	2,79 %	1,80 %	1,87 %	1,46 %	2,42 %	1,34 %

Spread	TLA1V		TLT1V	
	Before	After	Before	After
Minimum	0,44 %	0,41 %	0,26 %	0,24 %
Maximum	3,08 %	2,33 %	2,08 %	1,30 %
Average	1,36 %	1,14 %	0,74 %	0,51 %

Table 2: Average intraday spreads 40 days before and 40 days after the commencement of market making

Graph 3 exhibits the distribution of the average spread for the time period before and after market making. It shows the distribution of the average spreads calculated for each stock separately. Previously we have looked at averages of the average spreads, i.e. one days' average averaged over all stocks. What is visible from the chart, is that the period after the market making has had lower spreads over the days. And only one where the average spread was over 4%. With market making, there are no larger spreads.

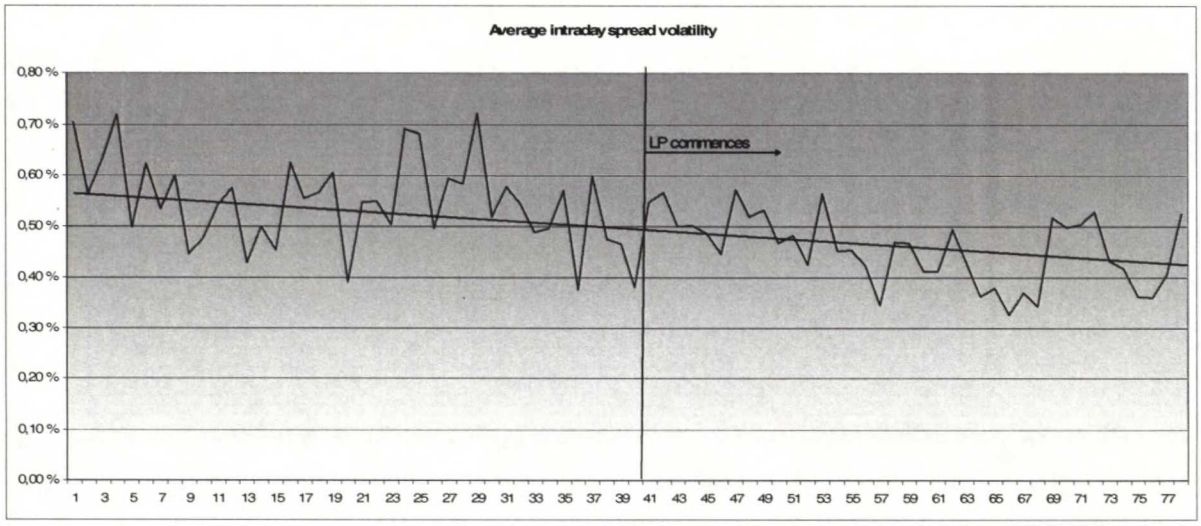


Graph 3: Distribution of Average Daily Spread

It is our conclusion that based on the available data one can not conclude that market making on a stock would automatically reduce the bid-ask spread. However, market making would seem to limit the area of the spread, which does imply a lower risk on a stock. This is one of the main arguments supporting market making functionality at the OMX. Findings would also be consistent and support the findings of Tevanen (2007) who found that the closing spreads had diminished, but was unable to measure the real intraday spreads. The study also indicates that the spread volatility would seem to be lower, as the spread is more concentrated on the narrower (1%- 2%) end. We will look at the volatility of the bid-ask spread in the following section.

6.2 Bid-Ask Spread Volatility

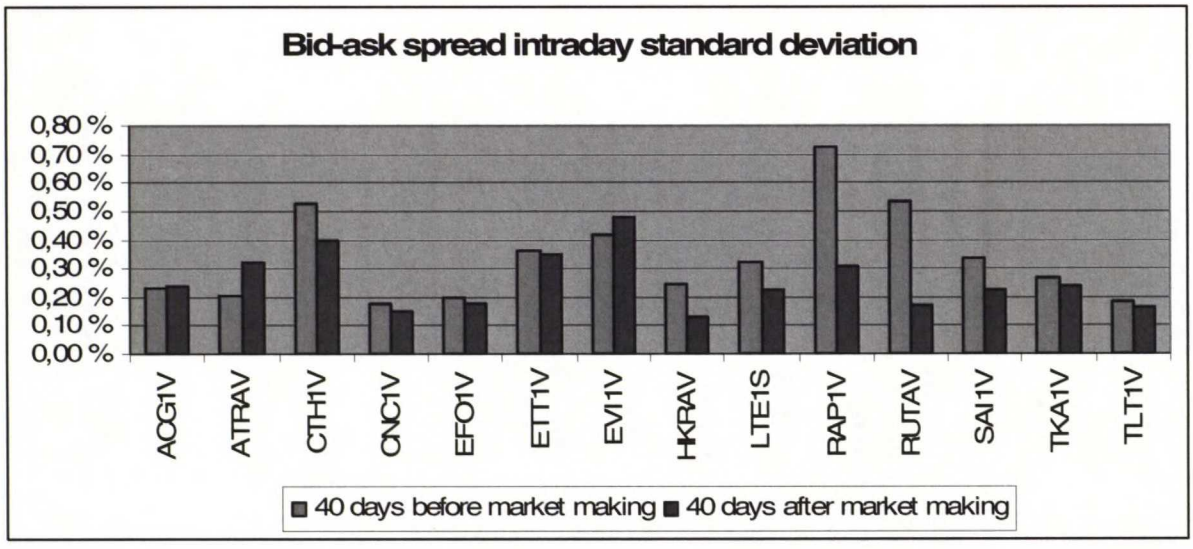
We have looked at each stocks bid-ask spread within 15 minute intervals and studied the standard deviation on average within the day. In addition we took an average of the averages to see if a clear trend was imminent. Graph 4 displays the combined average of the standard deviation of the spread for each day. The beginning of market making is indicated with an arrow.



Graph 4: Volatility of average intraday spread measured 40 days before and 40 after the commencement of market making

Since the trend on the daily averages is some what downwards pointing, we also calculated the standard deviation on intraday data for each stock separately. All intraday spreads within the days before market making had a standard deviation of 0,34%. The combined standard deviation of the bid-ask spread then fell after the commencement of the market making to 0,26%.

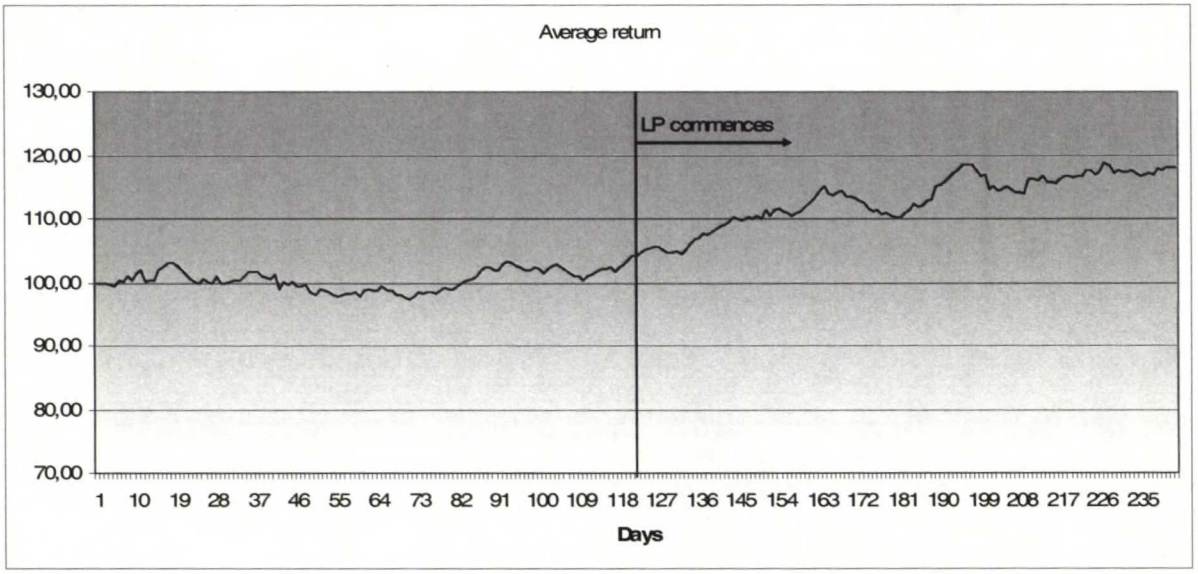
The following graph presents the average intraday standard deviation of the bid-ask spread before and after market making for each stock separately. Again, like in bid-ask spread the results do not give evidence that market making would always lower the volatility of the bid-ask spread. In three cases the average standard deviation of the spread grew some. However, what is interesting is that in some cases standard deviation of the intraday spread almost halved, which would imply that the prices on the trading board would have varied more before the commencement of the LP. This would be consistent with the results obtained from studying the size of the bid ask spread. Although it did not show clear evidence of improvement, there were results pointing to the direction that market making made the spread more stable, thus lowering the volatility of the spread during the trading day. These would consistent with the previous international studies, which have found less volatility on the spreads during the times market markets are obligated to quote.



Graph 5: Spread intraday volatility measured with 15 minute intervals.

6.3 Stock performance – abnormal performance

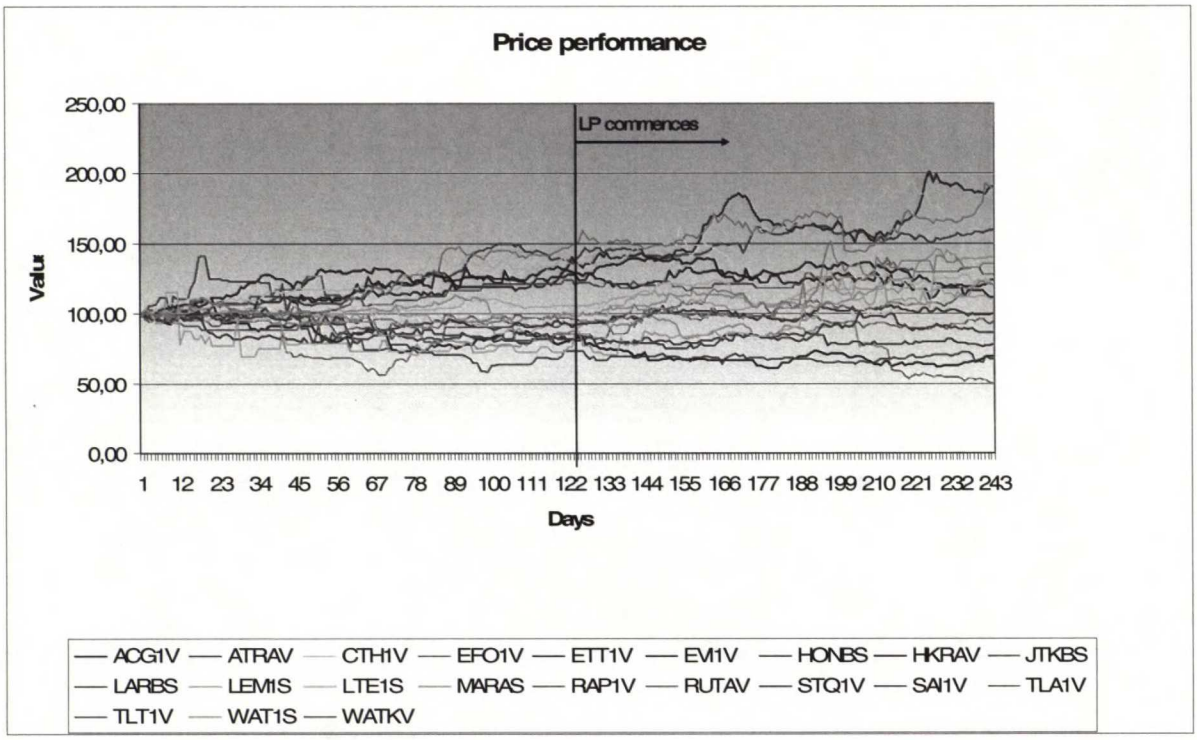
Graph 6 displays the average stock return of 21 of the shares with a market making agreement, which (in the graph) starts on the day 123 for all shares. As can be seen the improvement on average stock performance for all the shares, no matter on which calendar day the market making in real life begun, becomes apparent. The stocks gained on average 4,27 % on the 122 trading days before the commencement of the market making, after which they gained, on average 13.25 % during the following 122 trading days. In the graph, the date of the commencement of market making is market with a vertical line.



Graph 6: Average price return for period -122 to 122 trading days. Day 123 marks the commencement of market making.

These results are in line with previous studies conducted, and could be explained by theorem that investors wanting a premium for less liquid stock. Also Tevanen (2007) obtained similar results. He found increasing prices of about 4.2% which were statistically significant for stocks with a market maker he evaluated. As the stocks became more liquid, the risk premium for holding the asset dropped, thus increasing the asset price.

We also looked at the stocks separately. Graph 7 displays the price movements of the individual shares. As can be seen, the performance of some of the shares performed poorly after the market making on the stock began. What is visible from the chart is that the daily price movements tend to become larger after the market making has begun. This could be explained by that before market making the amount of trading was rather low, thus creating a number of days where the stock price did not move at all. When the market making begun, the trading activity increased and thus caused the closing prices to change.



Graph 7: Stock performance of individual shares during period -122 to 122 trading days. Day 123 marks the commencement of market making.

Although these results are clearly inline with the studies of Tevanen (2007), they overlook one important aspect. As already discussed in chapter 5 the recent years at OMX (and also globally) have been very bullish and thus an increase over any period, over any stock could be visible. Therefore it is vital to compare the price performance of the stocks with the performance of indices for the same period. That is, instead of just measuring the price performance, the abnormal performance should be looked at.

In the following, we studied the performance of the individual stocks and the performance with two main Helsinki indices. We compared the return of the stock with the return of an index for the same period. If market making would actually have a positive effect on the share price (as previously indicated) by lowering the risk premium on the stocks, the stocks should produce abnormal returns and perform better than the average market or in this case the index. Table 3 shows the average of rebased returns for each stock versus the rebased returns on OMX Helsinki All Share (HEX-index) index and OMX Helsinki 25 index (HEX25).

	Stocks	HEX-index	HEX25-index
Before market making days 1-122	4,31 %	2,23 %	5,88 %
After market making days 123-244	12,50 %	12,63 %	11,90 %
Total period days 1-244	18,09 %	20,55 %	24,04 %

Table 3: Average stock returns compared with indices for the respective periods before and after the commencement of market making. All stocks and indices rebased to a beginning value of 100 for the respective days.

As can be seen from the table, no evidence of abnormal returns can on average be found. It can be seen that, on average, the stock performance was inline compared with the indices, before and after market making. The result is not inline with the findings of Tevanen (2007) nor with Amihud et al 1986 stating that investors want a risk premium for more illiquid stocks. As the stock becomes more liquid the asset price should rise with the lowered required rate of return.

By looking at the individual stocks, we see high variance on the performances of the shares. Table 4 displays the minimum and maximum stock price performances and the median.

	Minimun	Maximum	Median
Before market making days 1-122	-26,54 %	47,00 %	-0,78 %
After market making days 123-244	-42,52 %	57,37 %	15,55 %
Total period days 1-244	-50,15 %	91,09 %	20,00 %

Table 4: The minimum and maximum stock price performances for the periods before and after the commencement of market making on the stocks.

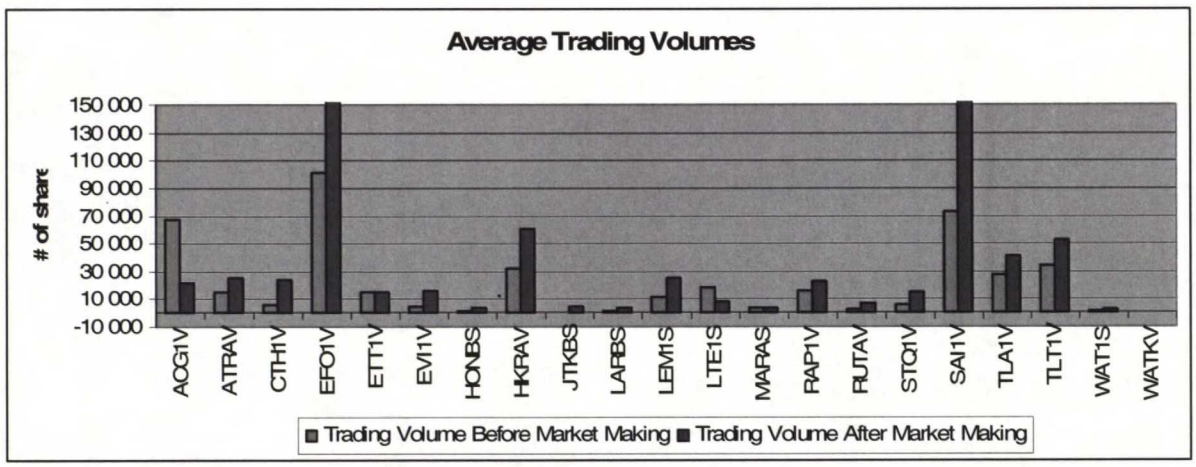
The worst performing stock dropped by over 26% in the first 122 days, while during the same period HEX index rose by 2 % and HEX25 –index rose by 5,58%. Best performing stock beat the indices by 30% and rose in all 244 days over 90%. All the individual stock price performances are graphed and available in the appendix. They are also graphed against the performance of both indices.

The average returns studied previously and here overlook one important factor. What can not be seen from the figures are possible company notices that caused a reaction to the stock price. Unanticipated events could have caused large price changes and surges in trading activity, thus increasing the price variance and volumes. This would partially explain the high

variances in stock price performance. Unfortunately the examination of price performance in this study is not as highly developed that it could take into consideration such events, we leave the subject for future studies and so far conclude that no clear abnormal returns were to be found after the market making begun, contradicting one of the hypothesis.

6.4 Trading volumes

Trading volumes were measured on average basis. Before the commencing of market making the average daily trading volume was 23 031 shares / day, with a high standard deviation of 28 000. The range of the averages varied from 1077 to 101 866 shares depending on the underlying. After the commencement of market making, the average trading volume went up by 118% to 50 327, with averages ranging from 3 003 to 298 000 and with an extremely high deviation of 91 054. Only one of the shares had a lower average trading volume at the latter period of the data. Results for individual stocks are presented in graph 8. Increase in trading volumes after the commencement of market making would be consistent with the findings of Tevanen (2007) who found evidence of increased trading amount with an average of 366%.



Graph 8: Average daily trading volumes calculated for 122 trading days before and after the commencement of market making

One downside of looking at the trading volume is that we can not distinct between market trades or matched trades. It can be so, that the volumes before or after are due to large block

trades which could make up large part of the trading volumes, thus downsizing the effect of the market making on the trading volumes.

However, although we can not completely disregard the previous argument, we could obtain supporting evidence by looking at the number of zero volume trading days. One of the motivations to sign a market marking agreement for Lännen Tehtaat Oyj was to decrease the number of zero volume trading days. If these expectations are met, the number of those days should decrease after introducing market making. Table 5 displays the number of zero volume trading days 122 days before and 122 after market making commenced.

	ACG1V	ATRAV	CTH1V	EFO1V	ETT1V	EVI1V	HONBS
Before market making days 1-122	0	0	10	0	13	27	41
After market making days 123-244	0	0	2	0	2	31	22
Total period days 1-244	0	0	12	0	15	58	63
	HKRAV	**JTKBS**	**LARBS**	**LEM1S**	**LTE1S**	**MARAS**	**RAP1V**
Before market making days 1-122	0	102	52	3	5	53	34
After market making days 123-244	0	72	43	0	2	24	20
Total period days 1-244	0	174	95	3	7	77	54
	RUTAV	**STQ1V**	**SAI1V**	**TLA1V**	**TLT1V**	**WAT1S**	**WATKV**
Before market making days 1-122	42	14	1	12	0	79	108
After market making days 123-244	10	2	0	0	0	29	60
Total period days 1-244	52	16	1	12	0	108	168

Table 5: The number of zero-volume trading days per stock before and after market making

What is imminent form the table is that some of the stocks were highly illiquid by begun with. In total there were 2562 (21 stocks with 122 days) trading days before market making and after it. After the market making begun, the amount of zero volume trading days dropped by 277 to 319 days, where as before the figure stood at 596. This would support the notion of increased trading activity and thus also at least partially explain the increases in trading volumes.

These findings are consistent with previous studies as well as the "sales arguments" for market making. It can not be concluded in this study whether investors are more interested in the shares due to the lowered spread volatility or perhaps because a market maker guarantees

an exit from the investment thus reducing risk, but what can be seen from this study as well as the study conducted by Mr. Tevanen (2007), is that market making does have an effect on the trading volumes, supporting the initial hypothesis of improved liquidity.

6.5 Stock Price Volatility

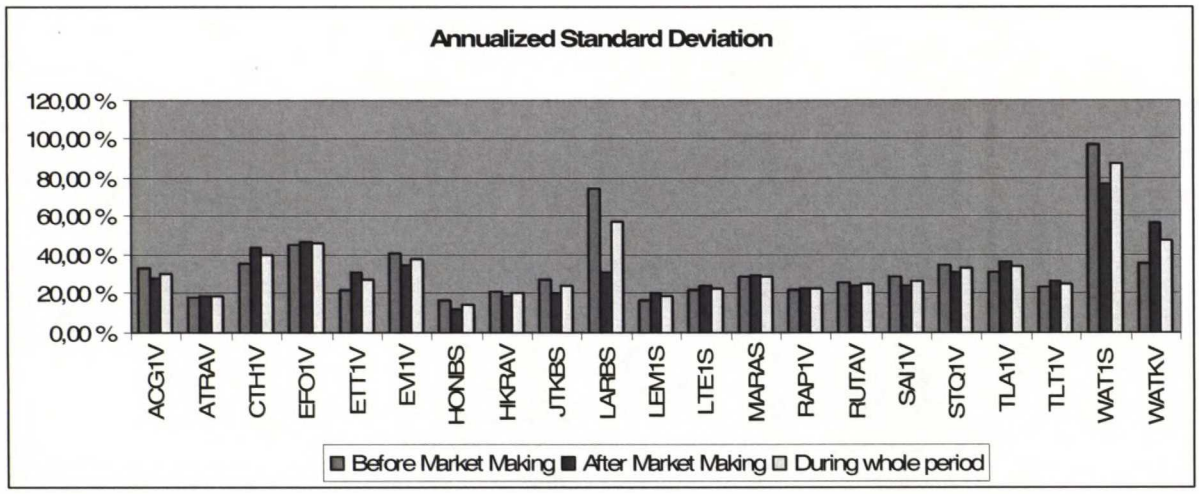
We measure the volatility of the shares before and after the commencement of the market making. If we look at the historical price data of the shares discussed in section 6.3, one could expect the volatility to rise as the reaction in the share price was imminent. Since the stock has been illiquid before the commencing of the market making, the stock price might have not reflected the "correct price" of the share. After the increase in liquidity, the pricing of the share has become more efficient, and thus there is as reaction in the stock price. This would explain the increase in the volatility of the share. Of course, in time, the volatility would have to become lower in order for the theorem to hold.

Table 6 displays the standard deviations on average. As can be seen, on average, there was only very small reduction in the annualized standard deviation with the commencement of market making. A drop in standard deviation would have been in line with the purpose of market making.

	Standard deviation
Before market making days 1-122	33,30 %
After market making days 123-244	31,36 %
Total period days 1-244	32,69 %

Table 6: Average annualized standard deviation of sample shares calculated for periods before and after the commencement of market making

In order to have a better understanding of the volatility we will also look at each stock individually.



Graph 9: Annualized standard deviations for period of 122 trading days before and after the commencement of market making and over the total 244 trading day period.

Graph 9 shows the annualized standard deviations for each of the stocks separately before the market making (T-122 to T), after the market making (t to T + 122) and for the whole period.

Again, as can be seen from the chart, no clear evidence exists that market making would have reduced the volatility of the returns. There was no clear trend between the period before and after the market making. Only in 10 cases the standard deviation of the stock price became less as market marking commenced, the largest observation with Larox. There the annualized standard deviation fell from 75% to 31%. However, since there is clearly no consistency we would have to assume this to be random and not be connected with market making at all.

Without looking at the data one could make an assumption that in some cases market making would increase the price volatility – quite the opposite of what is hypnotized. However, closer look at the data reveals that, as discussed earlier, the volatility would mostly seem to be due to technical measuring reasons. Since the standard deviation is measured from the closing prices, stocks with a large number of zero volume trading days seem to gain more volatility as number of zero trading days decreases.

Also, since the stock has been illiquid before the commencing of the market making, the stock price might have not reflected the "correct price" of the share. After the increase in liquidity,

the pricing of the share has become more efficient, and thus there is as reaction in the stock price. This could partially explain the increase in the standard deviation for some of the stocks. Of course, in time, the volatility would have to become lower in order for the theorem to hold. This however, would be discussed in a different study in the future. As the amount of data is rather limited, it would be better to be cautious about making conclusions about the results, at least in using it to support the hypothesis.

7 SUMMARY AND CONCLUSION

The purpose of this study was to analyze the effects of a market maker on a company's stock at the Helsinki Stock Exchange. The subject has been studied internationally widely, however, only few studies have been done on Finnish stocks. The objective of the study was to discover if a market maker actually adds value to the company and do investors appreciate it. The main hypothesis was that having a market maker reduces the intraday spread as it is limited according to the rules set by the stock exchange, which then improves the liquidity of the stock. Since liquidity can be defined in many ways, it was observed via intraday spread and trading volumes. In addition, we studied the effects of a market maker on a stock's intraday spread volatility. Also, in order to see whether investors value on hypnotized increase in liquidity (lower bid-ask spread) we also studied possible effects on stock price, i.e. on the return of the stocks. If market making was to be successful also this should have been visible on the trading volumes and price volatility as the stocks become more liquid.

We found that a market maker has an effect on the bid-ask spread of a stock. When viewed across the sample, he commencement of market making reduced the average intraday bid-ask spread measured in 15 minute intervals from 1.49 % to 1.15 %. What could be observed was the decline in maximum average intraday spreads. This is an important factor for investors as spread represents the concession they have to make in order to sell the stock. Also supporting the view of an investor was the drop in intraday bid-ask spread standard deviation. This fell on average from 0.34% to 0.26%. However, in some cases the drop was close to 50%. As the spread is less volatile, more stable for investors and lessening the impact of timing in the investment decision, i.e. the time of the day should not matter is no new information has been given to the market. These results did not come as a surprise, since as maintained in many studies before one of the functions of market markets is to maintain a fair and orderly market and act suppliers of immediacy. The drop in standard deviation would be consistent with the findings of Barnea (1974) who firstly found a significant specialist effect on the bid-ask spread and also a positive correlation between volatility and the spread. In his assessment of market efficiency Logue (1975), stated that due to market maker's ability to reduce the cost of trading (bid-ask spread), the variance of the price series should be less than it otherwise would be. Unfortunately the only other study conducted on liquidity providing at the OMX used only

closing spreads (Tevanen, 2007). However, in that case also, there was evidence of market making decreasing the closing spreads in 102 out of the 108 shares.

One argument or even a "sale pitch" for the brokerages selling the service has been that a LP-agreement (market making) would increase the value of a company. As the stock becomes more liquid investors demand a lower risk premium for holding the asset and thus the stock price rises. Such evidence was also found on the previous study conducted on the Nordic market. Although we also found evidence that the share price increased on average by 13.25% during the days after market making, compared with 4.27% for equal number of trading days before the commencement of market making. However, as the Nordic market has been very bullish since 2002, we also measured stocks for abnormal returns. As it turned out, there was no evidence on abnormal returns. We measured the performance of the individual shares against the performance on the main Helsinki Indices and found the performance of the stocks to be inline with the performance of the indices. This would contradict the hypothesis of this study and the evidence reported by Jun et al. (2003) on the emerging markets and by Tevanen (2007) on the OMX. The hypothesis assumed that the premium investors want for holding an illiquid asset would be reduced by market making, which would have been in line with the studies of Amihud et al (1986). However, there was no evidence of such behavior.

The trading volumes rose after the commencement of market making by 118%. The increase was visible in all except one stock, indicating an improved liquidity. This was inline with the findings of Tevanen (2007), who reported an average increase of 396% in trading volumes. Since trading volumes do not separate between large block trades and market trades, we also wanted to see if market making had had any visible effect on the amount of zero-volume trading days, i.e. trading days where no trades are made. We found evidence supporting the increase in trading activity. After the commencement of market making, the amount of zero-volume trading days clearly dropped across all except one stock. The total number of zero-volume trading during total of 2562 days almost halved from 596 to 319, supporting the hypothesis of increased liquidity with market making.

The effect of market making on price volatility was somewhat weak. As the liquidity is an important factor of price volatility, we would have expected a decrease in the volatility

through increased liquidity. However, the price volatility remained on average the same before and after market making, or in some cases even increased. Part of the volatility is due to the fact that as there was a large number of zero-volume trading days, increase in trading automatically creates more volatility as the price changes from day to day. The high volatility on the other hand could be explained by that still after the market making the stocks are rather illiquid and most of the trading is based on information. As already brought up by Stoll (1979) and recently studied by Wu (2003), illiquid stocks generally have a higher percentage of informed trading than liquid stocks and are much more sensitive to it. Thus as there is no "noise" trading, the informed trading translates into much higher spreads for infrequently traded stocks, keeping the volatility rather high.

To conclude, the main function of Liquidity Providing, i.e. market making would seem to work as planned. The overall liquidity, measured by the bid-ask spread as well as turnover (or non-zero trading days), of the shares increased after the commencement of market making. However, what was interesting in the study was that investors did not value the increase in liquidity enough to lower their demanded risk premium. This would indicate that although market making provided increased liquidity in the form of lower bid-ask spread, lower spread volatility and increased turnover, the increase did not prove sufficient for investors and their demanding risk premium as the stock prices did not show any abnormal returns. It can be that the stocks were highly illiquid in the beginning and although their liquidity did increase, they were still seen as illiquid and risky. Maybe after some time, the increased liquidity would create more liquidity and eventually lower the risk premium. This however, will be for the future studies to find out.

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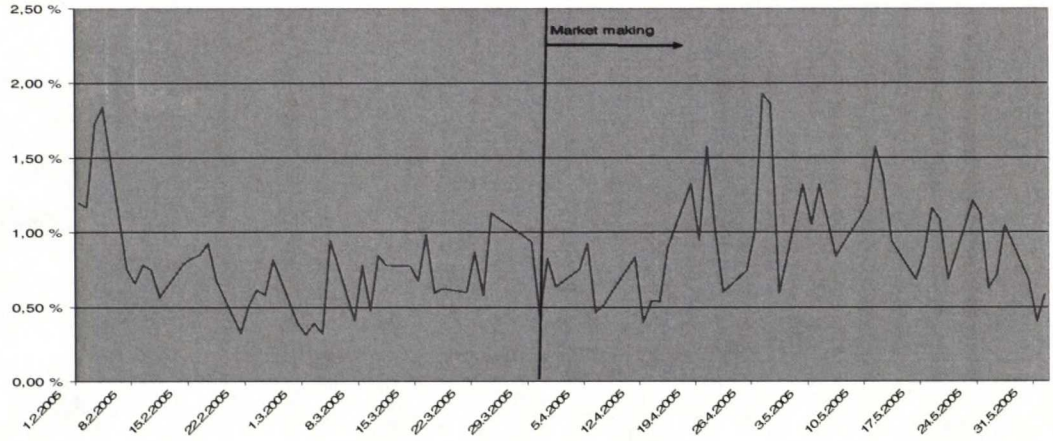
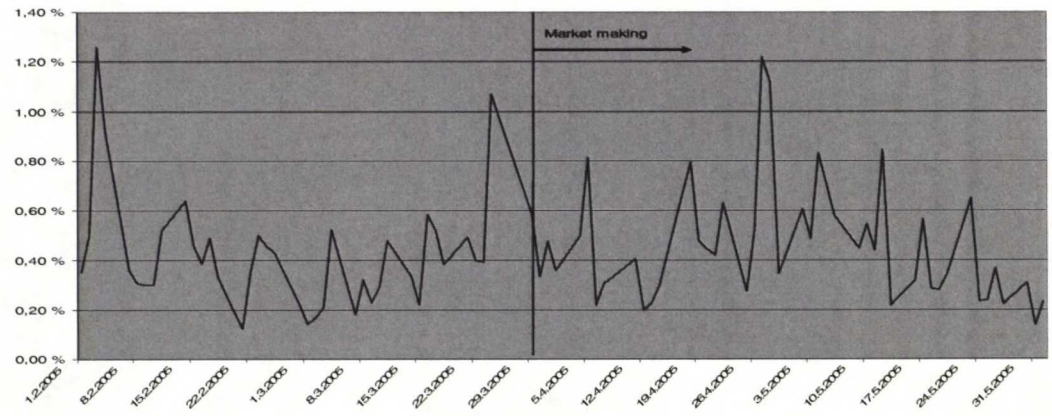
Appendix:

Aspocomp Group Oyj (ACG1V)

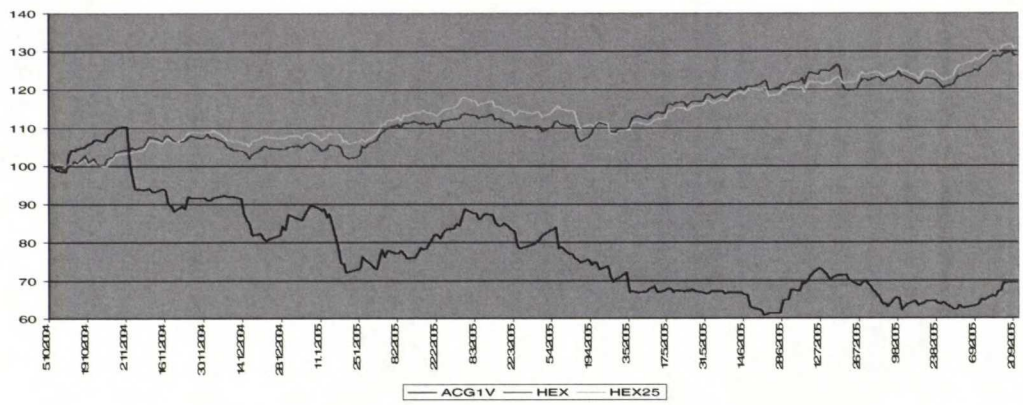
ACG1V average intraday spread



ACG1V intraday spread volatility



Rebased stock and index return



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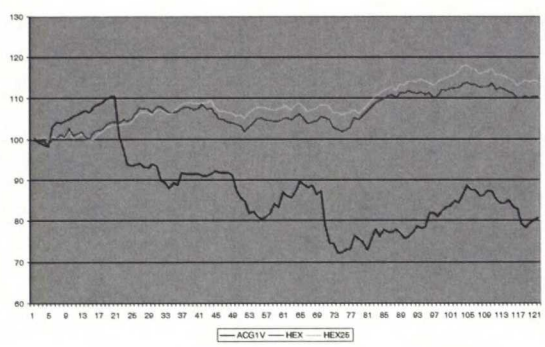

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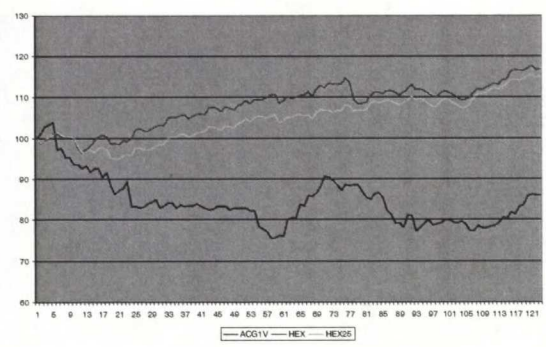
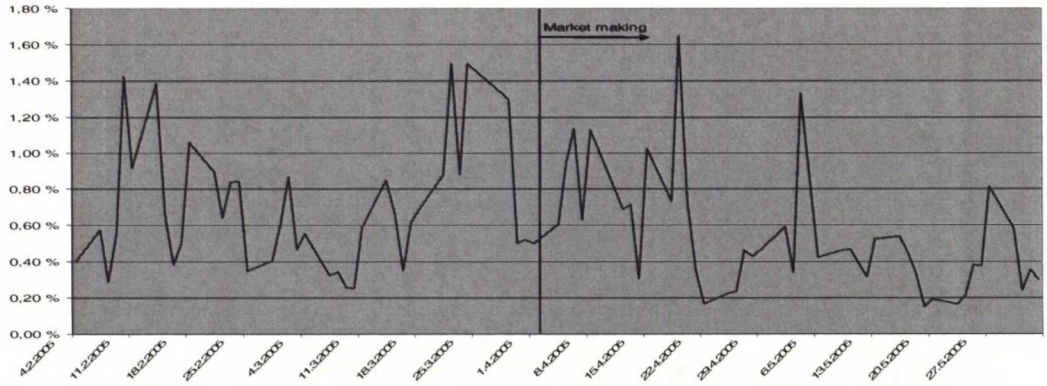
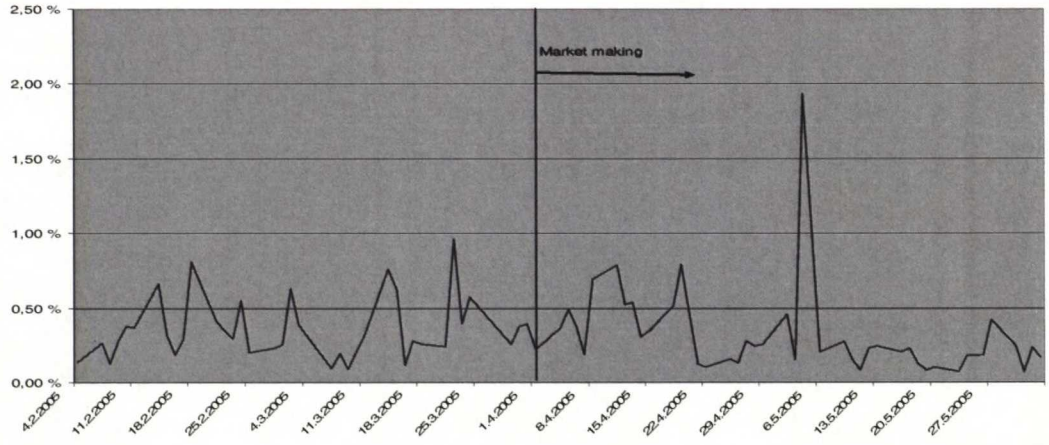


Atria Yhtymä Oyj (ATRAV)

Atria Oyj average intraday spread



Atria Oyj intraday spread volatility



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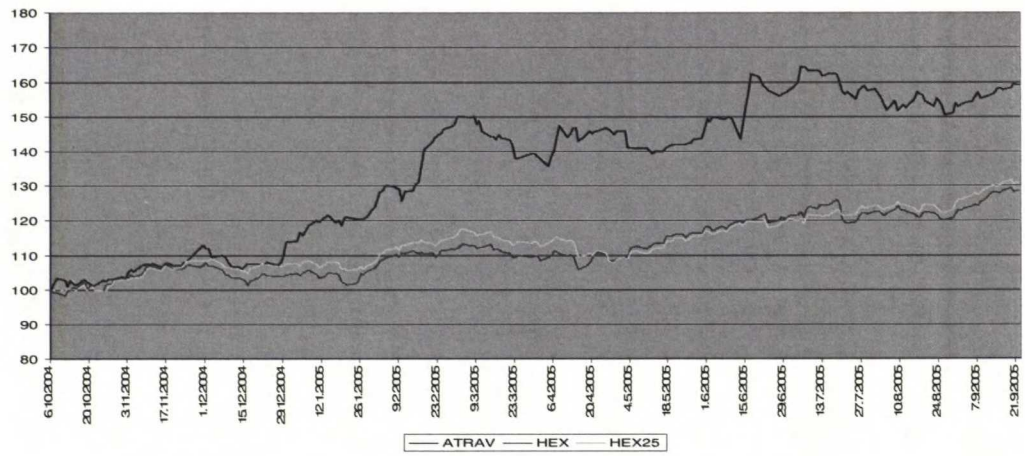

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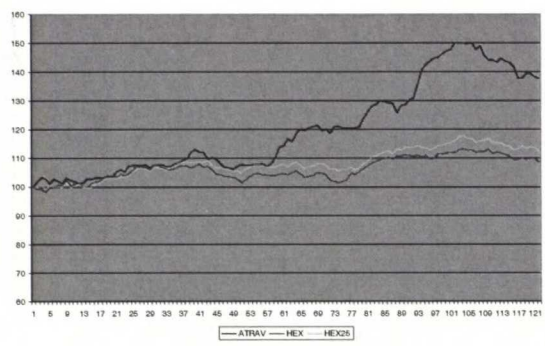

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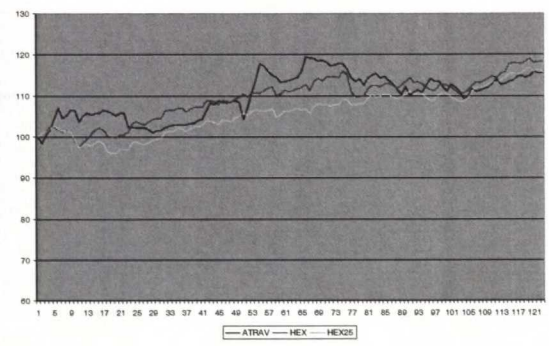

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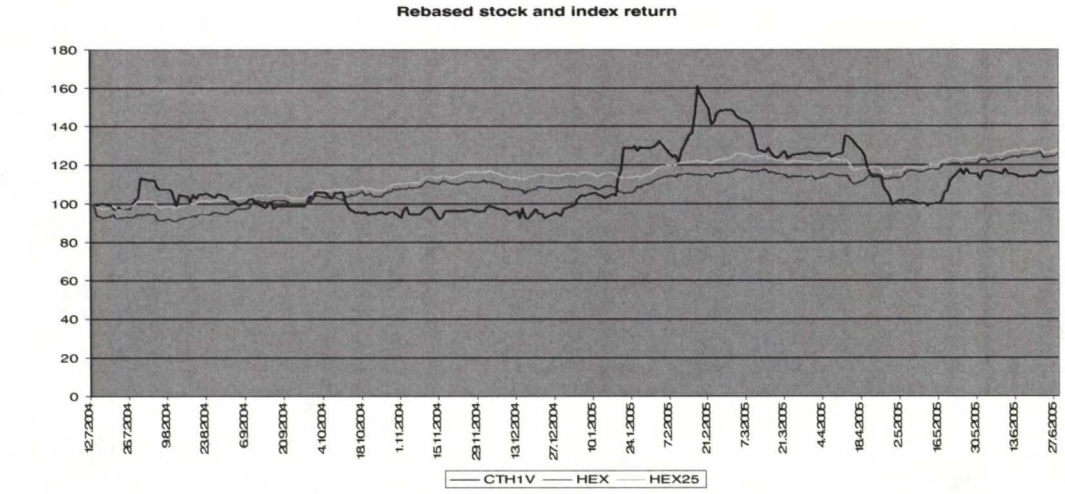
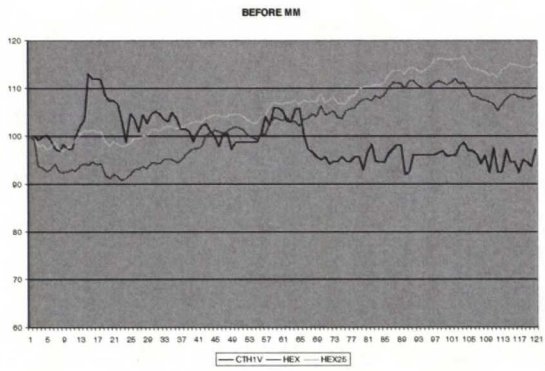
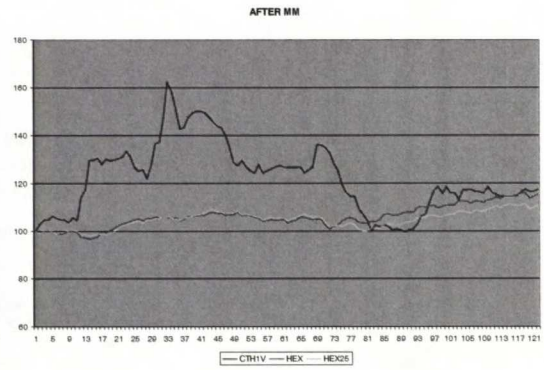
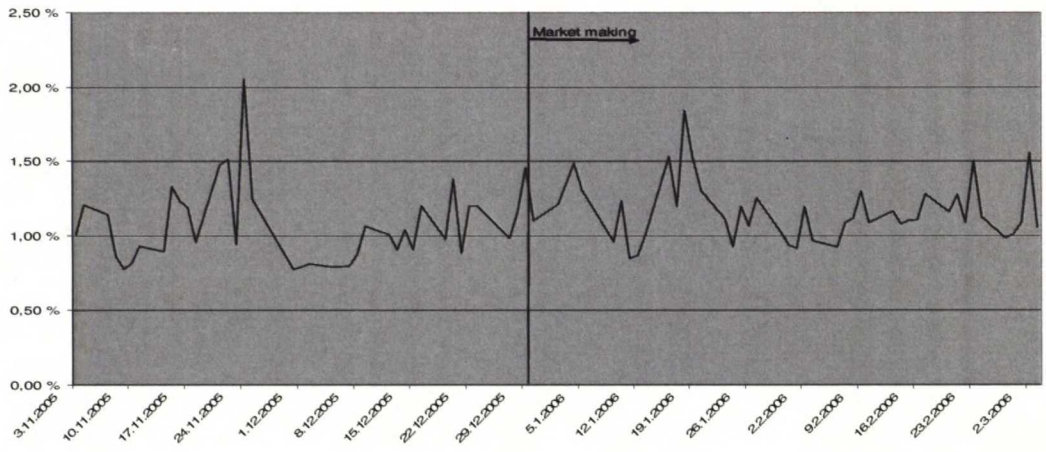




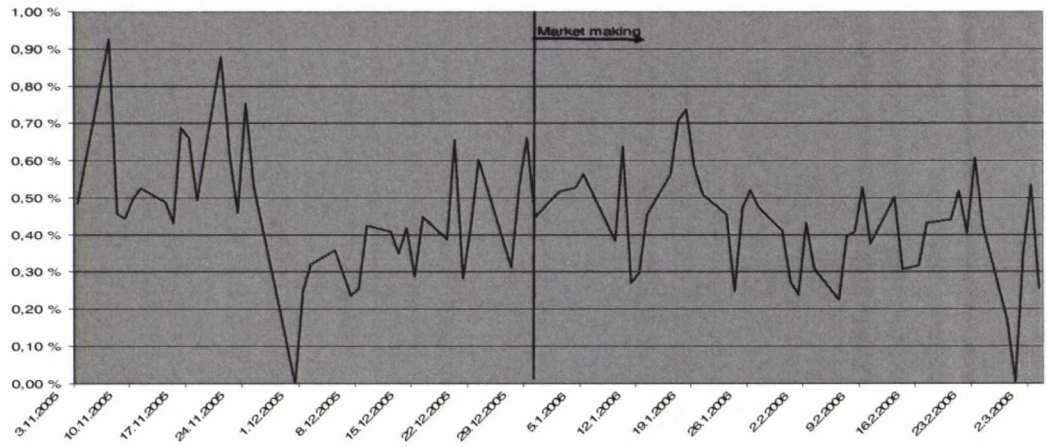


Cencorp Oyj (CNC1V)

Cencorp Oyj average intraday spread

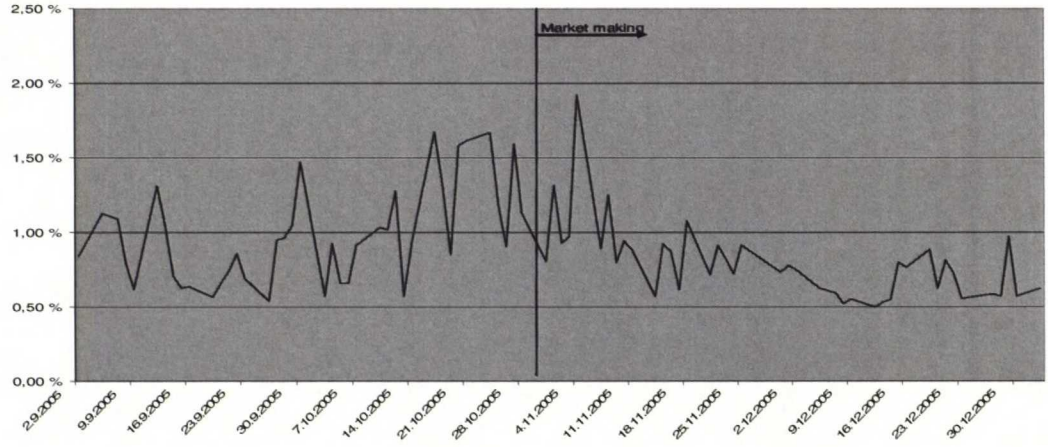


Cencorp Oyj intraday spread volatility

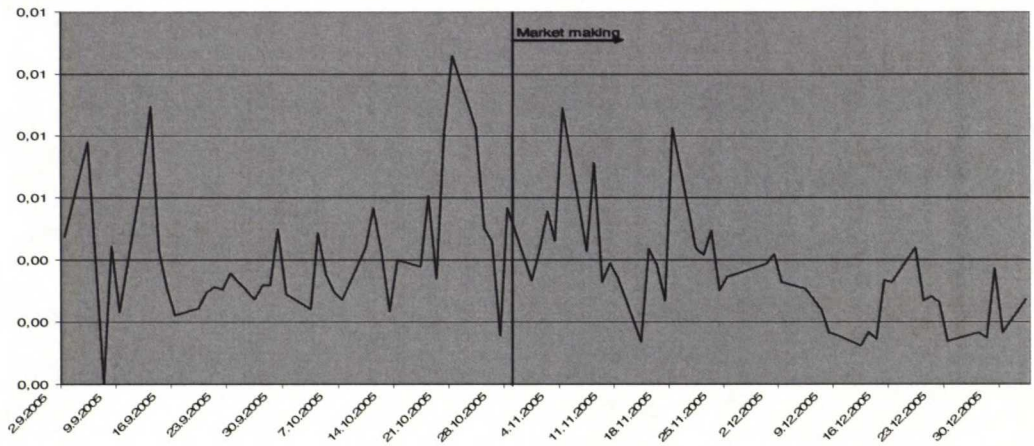


Efore Oyj (EFO1V)

Efore Oyj average intraday spread



Efore Oyj intraday spread volatility



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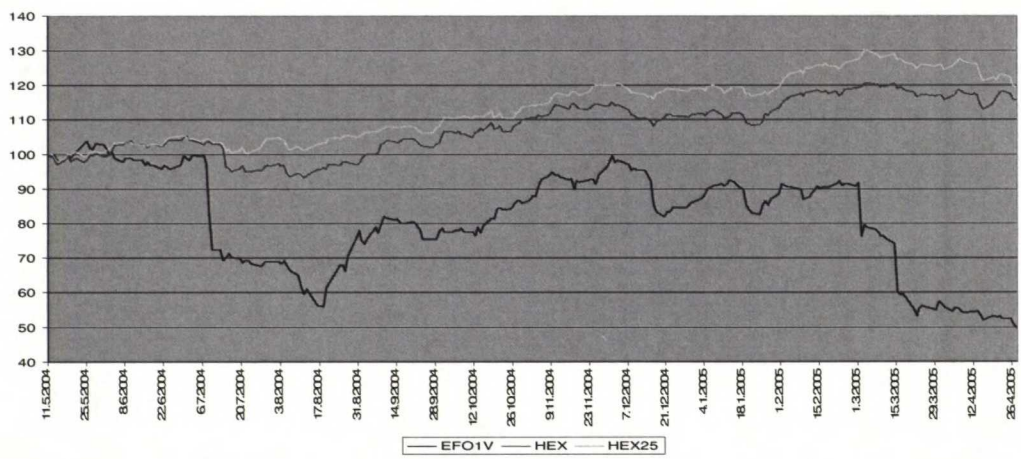

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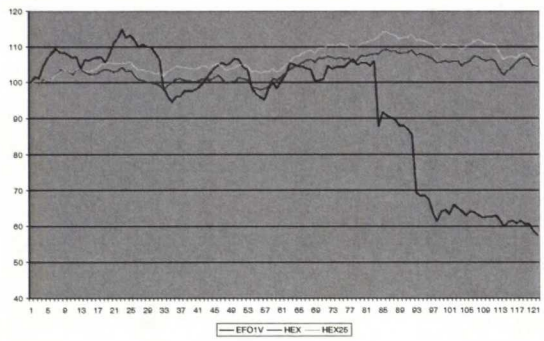

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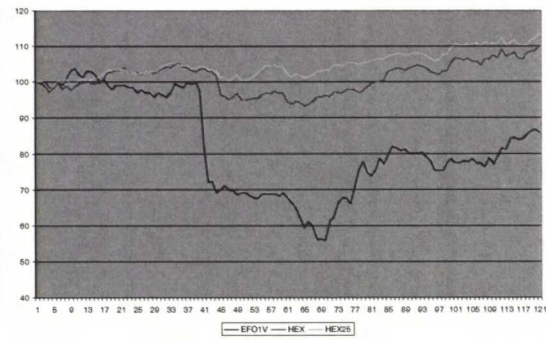

Etteplan Oyj (ETT1V)

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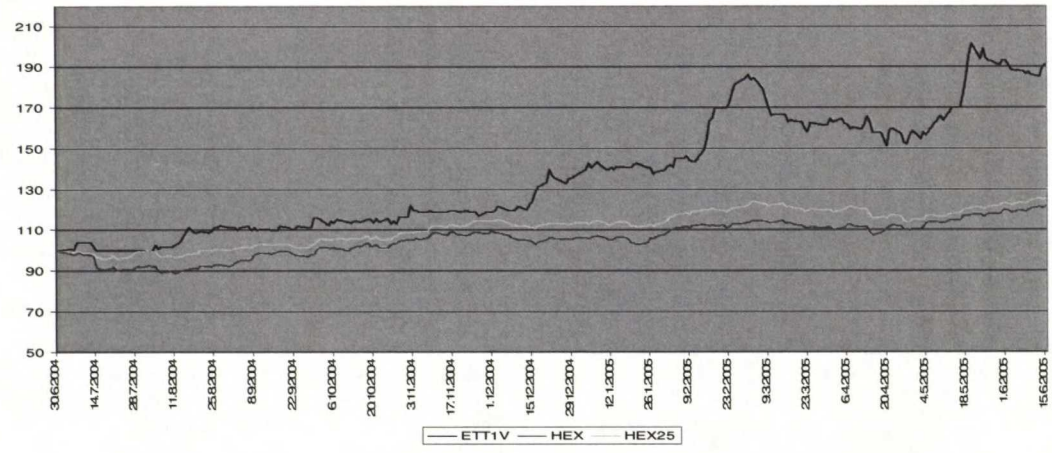

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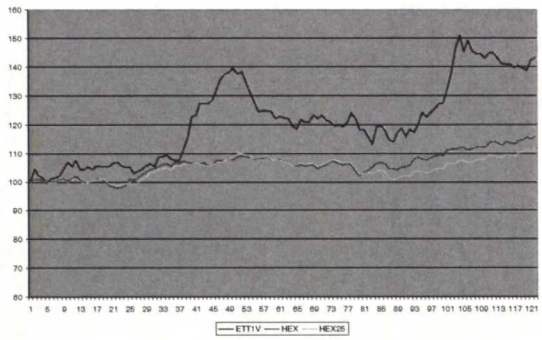

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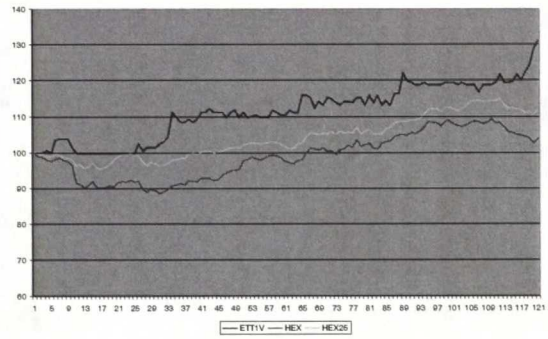

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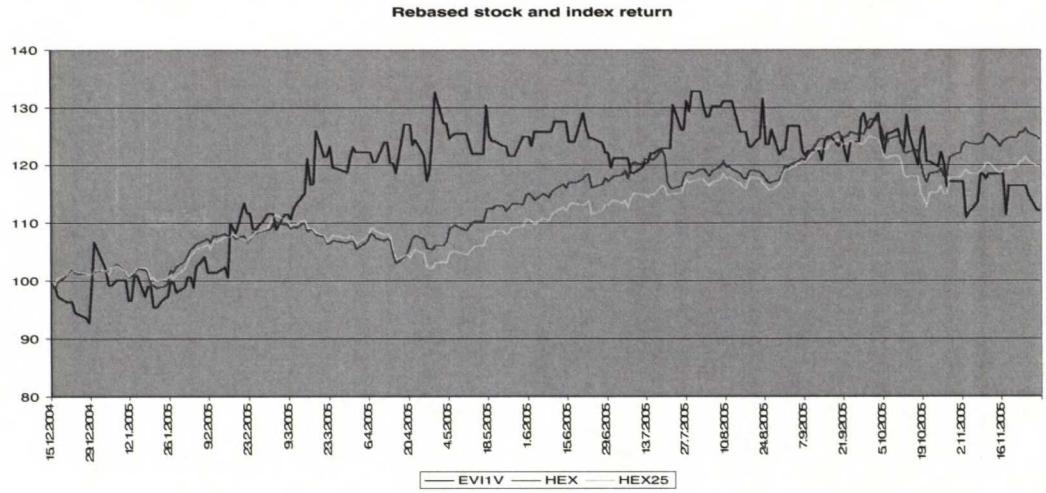

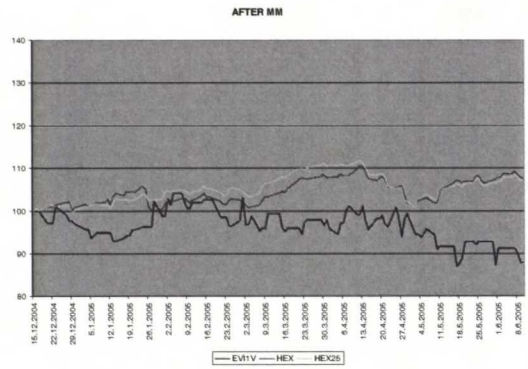

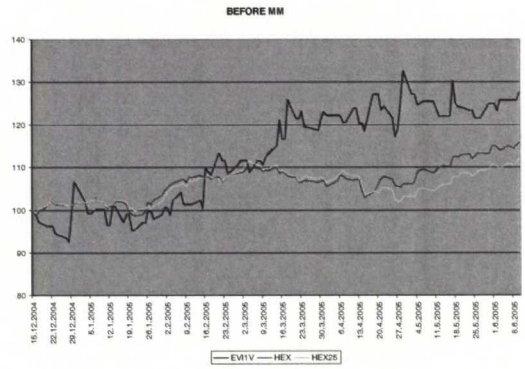

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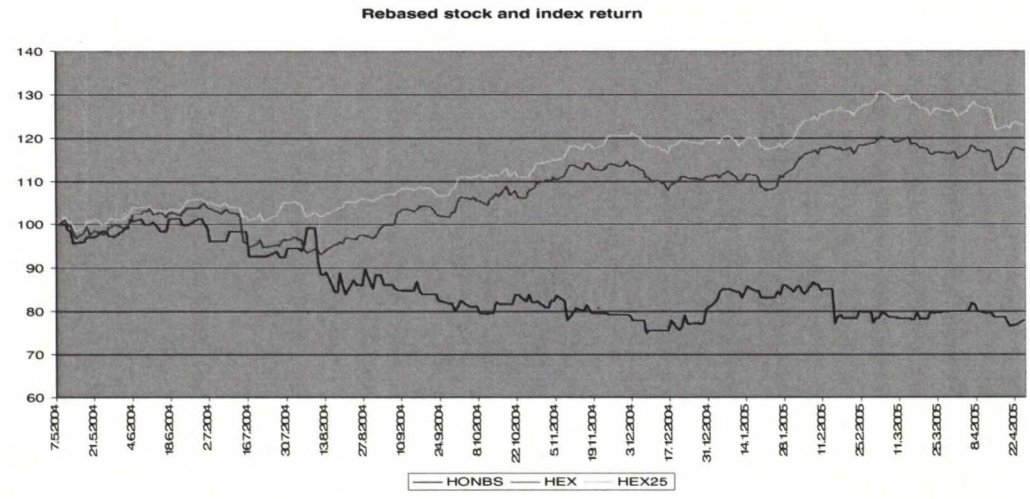
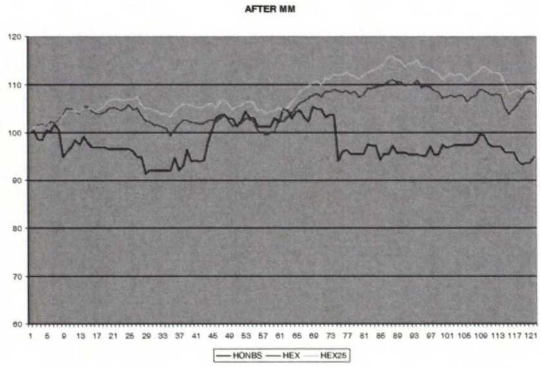
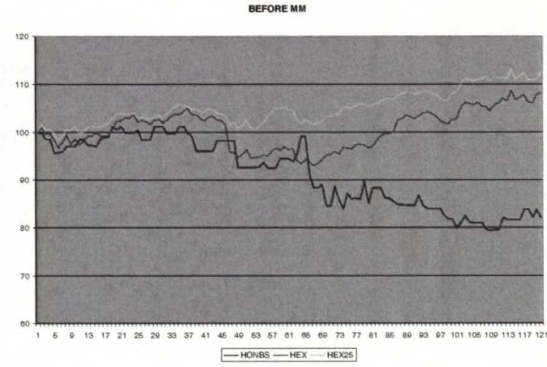
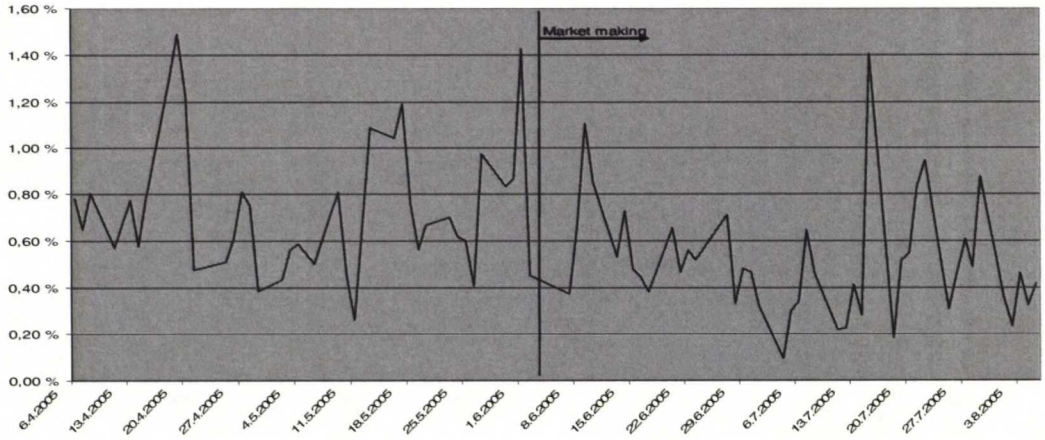




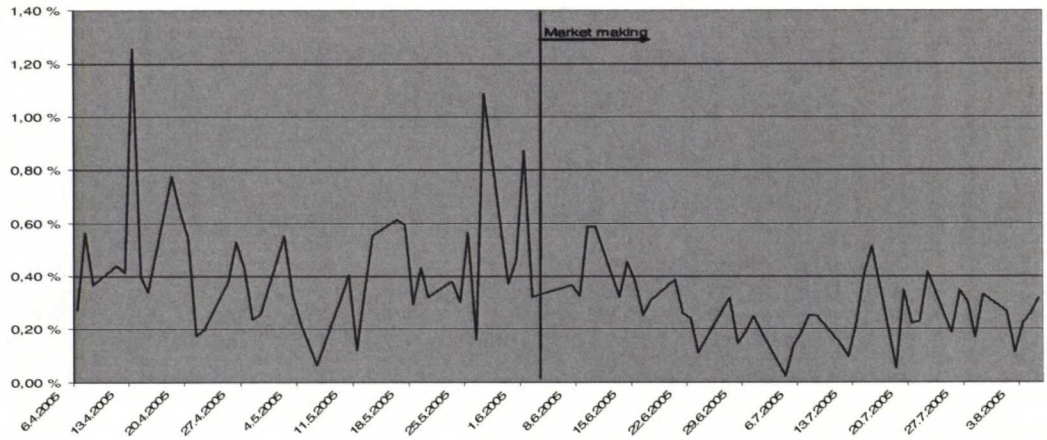


HK Ruokatalo Oyj (HKRAV)

HKRAV average intraday spread



HKRAV intraday spread volatility



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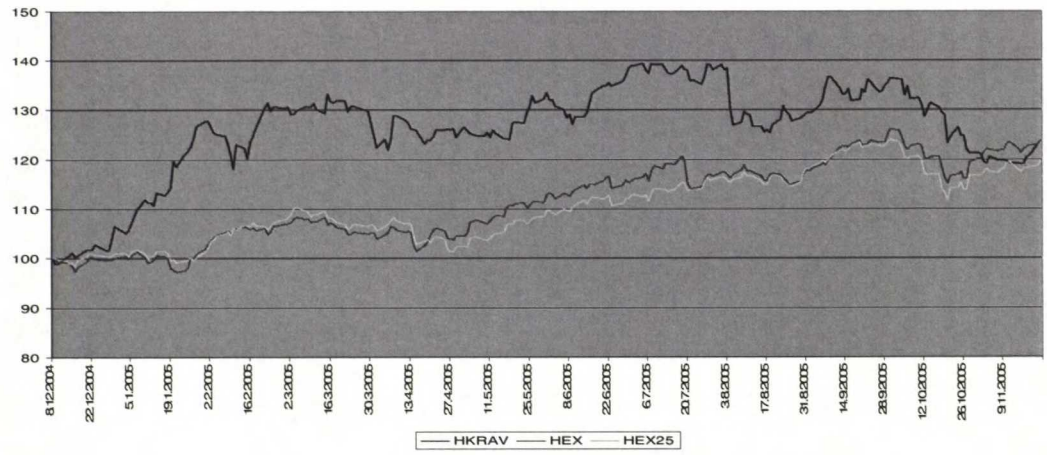

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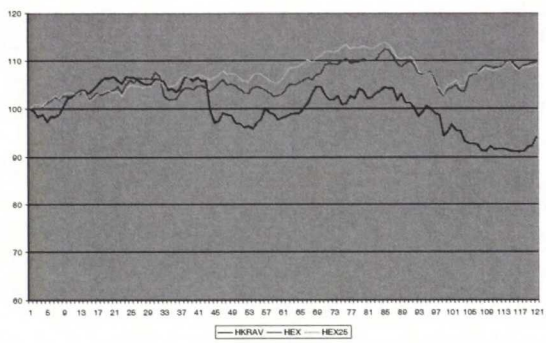

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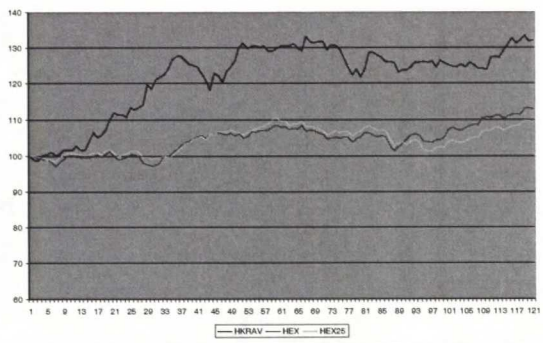

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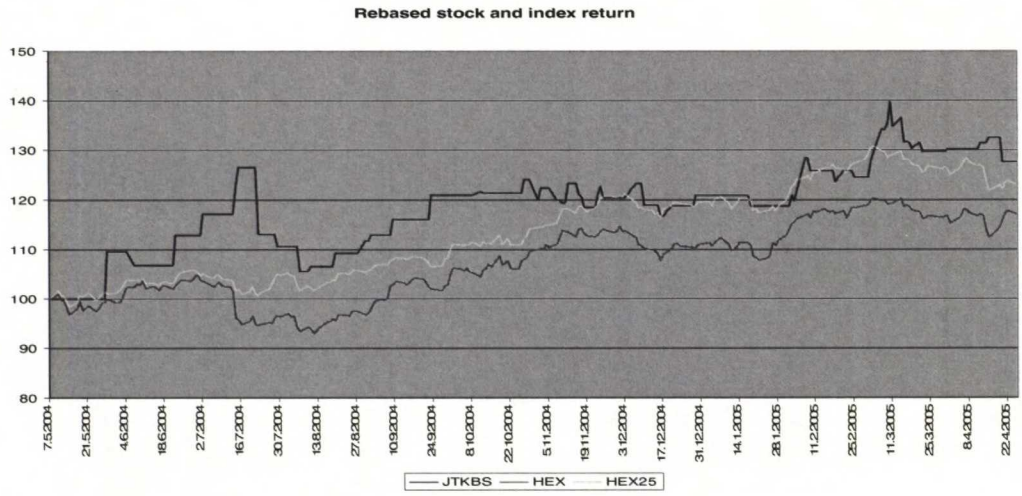

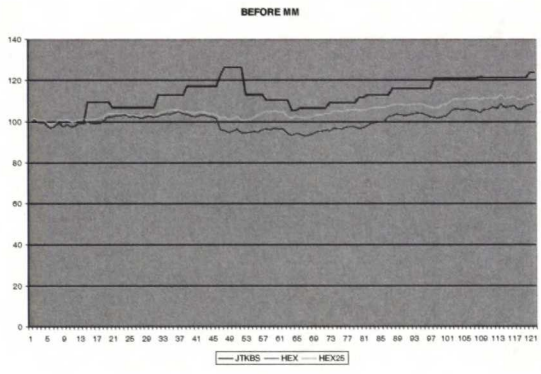

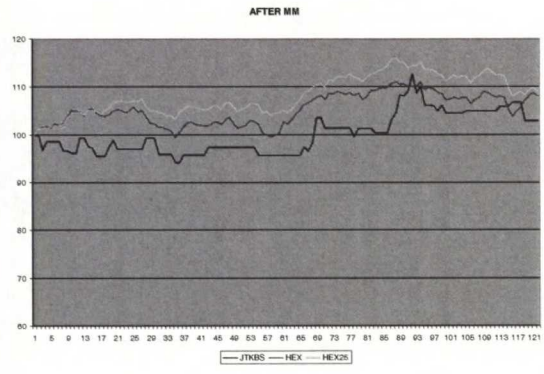

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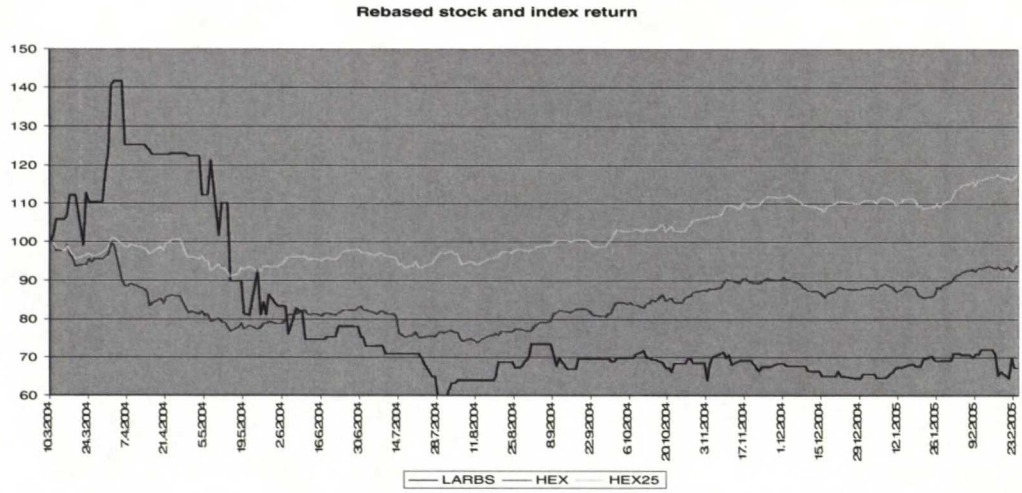
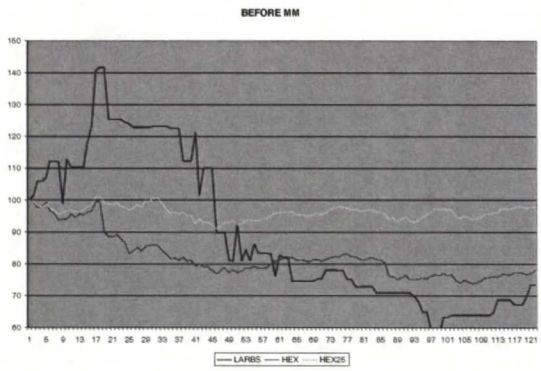
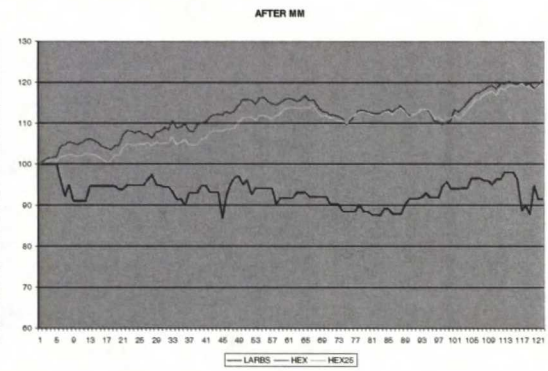
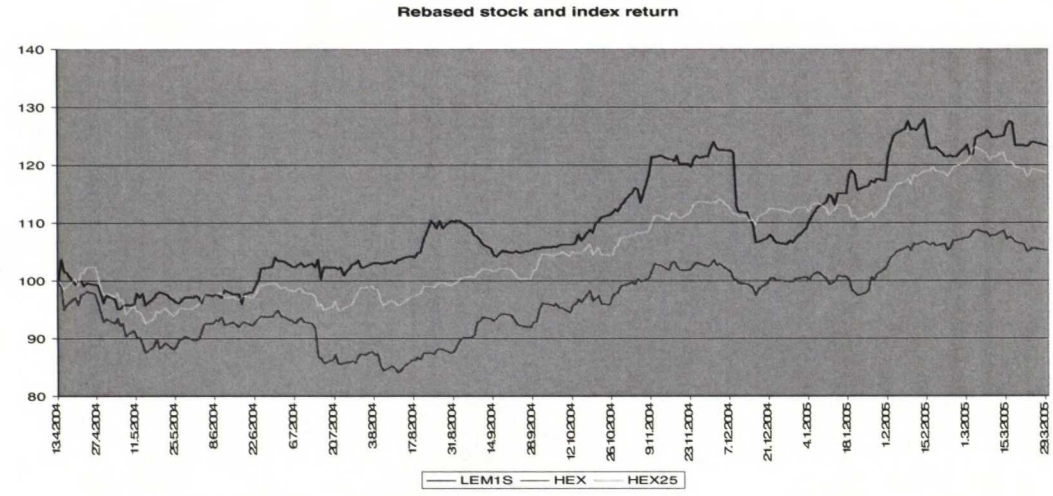
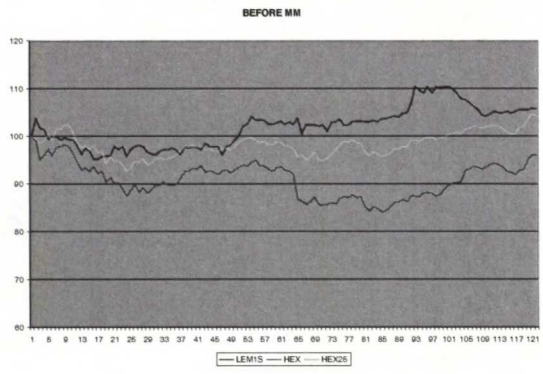


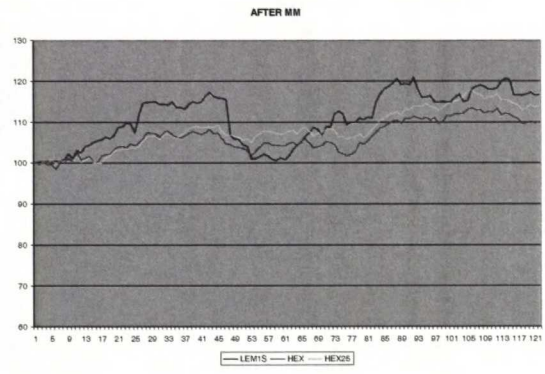




Lemminkäinen Oyj (LEM1S)

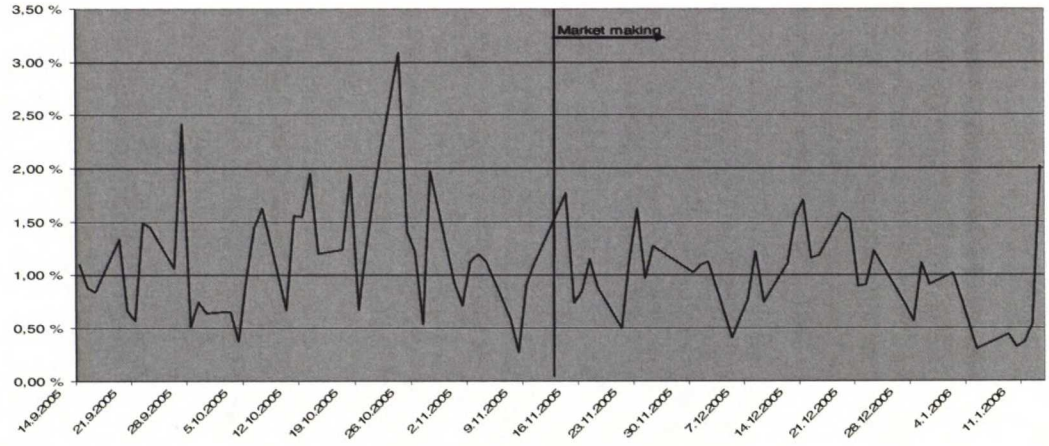




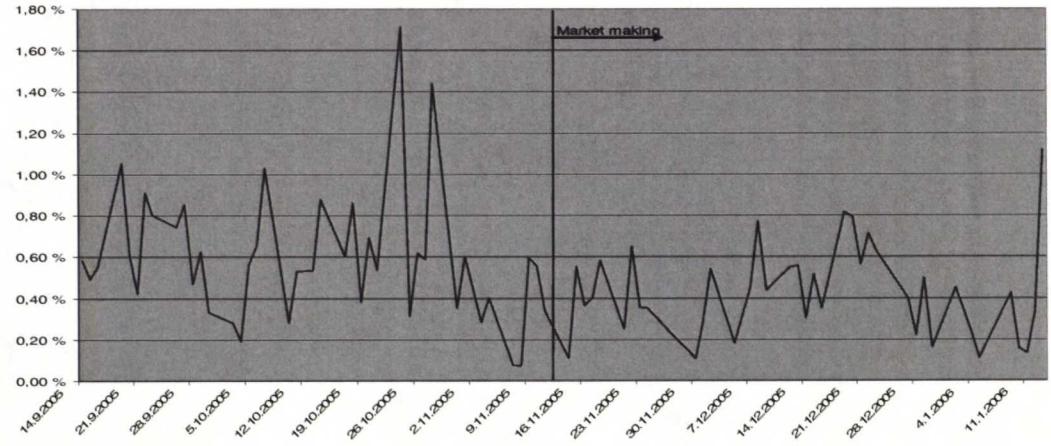


Lännen Tehtaat Oyj (LTE1S)

LTE1S average intraday spread



LTE1S intraday spread volatility



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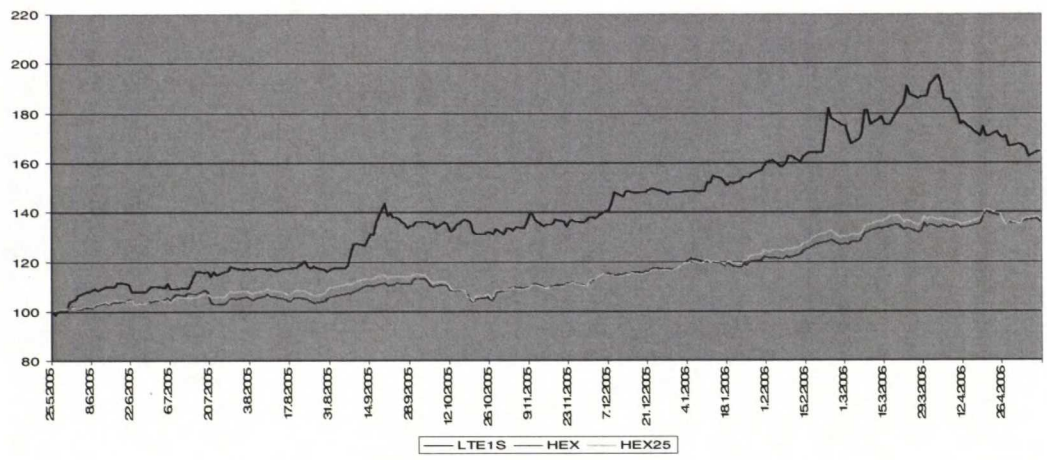

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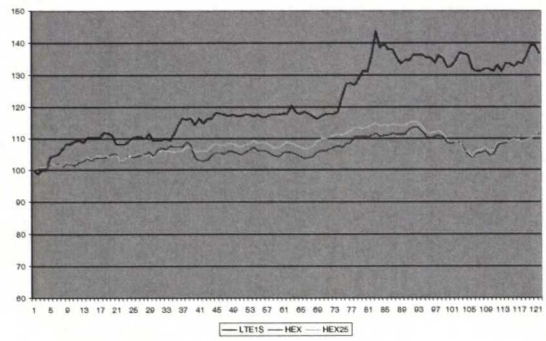

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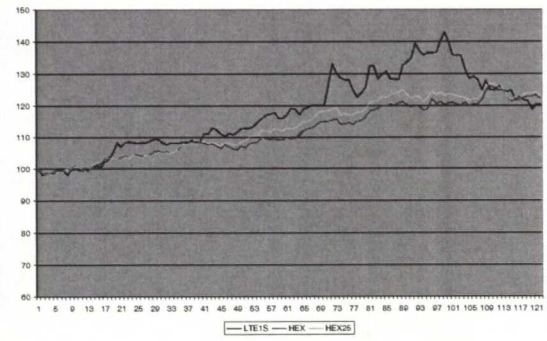

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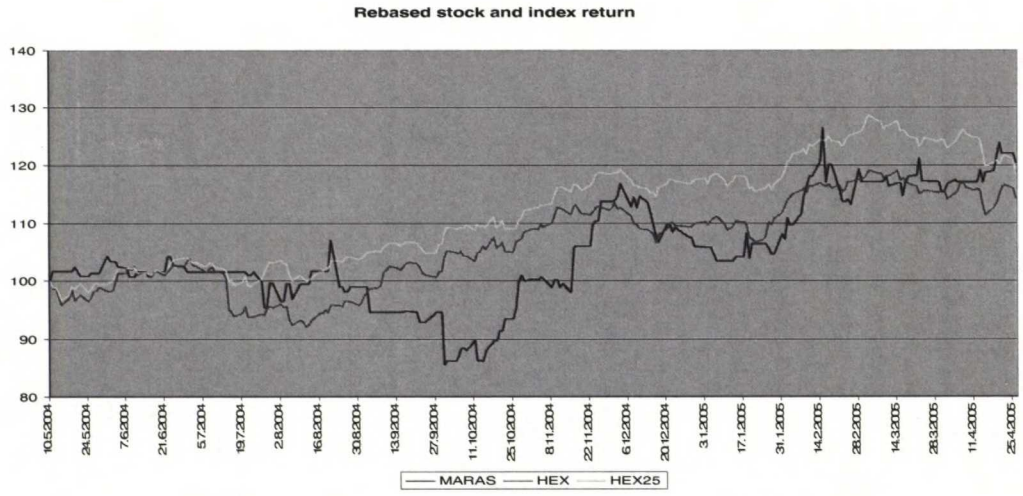
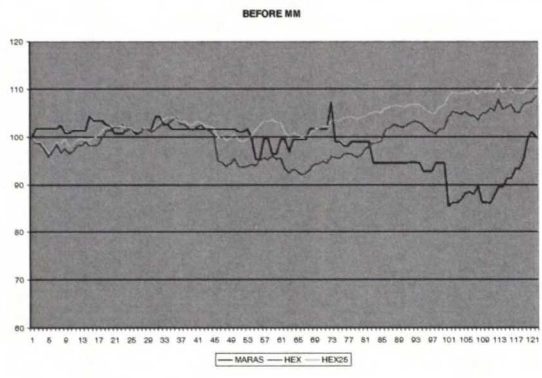
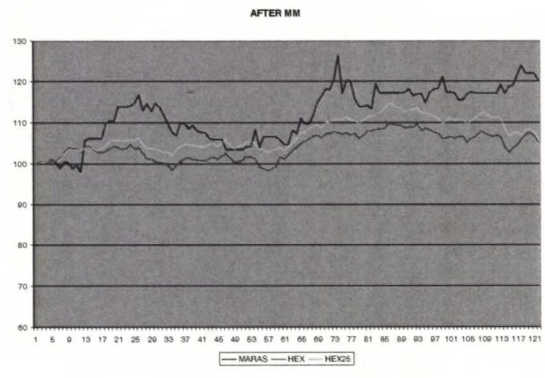
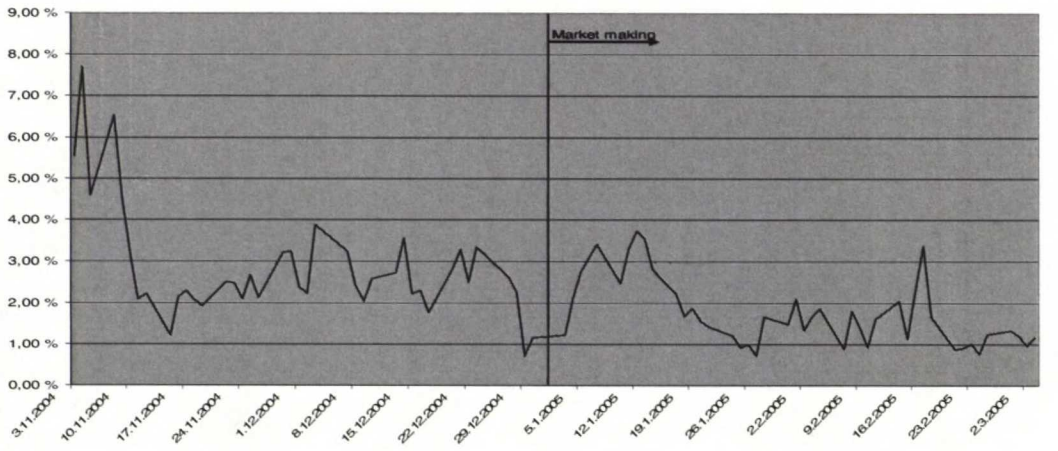




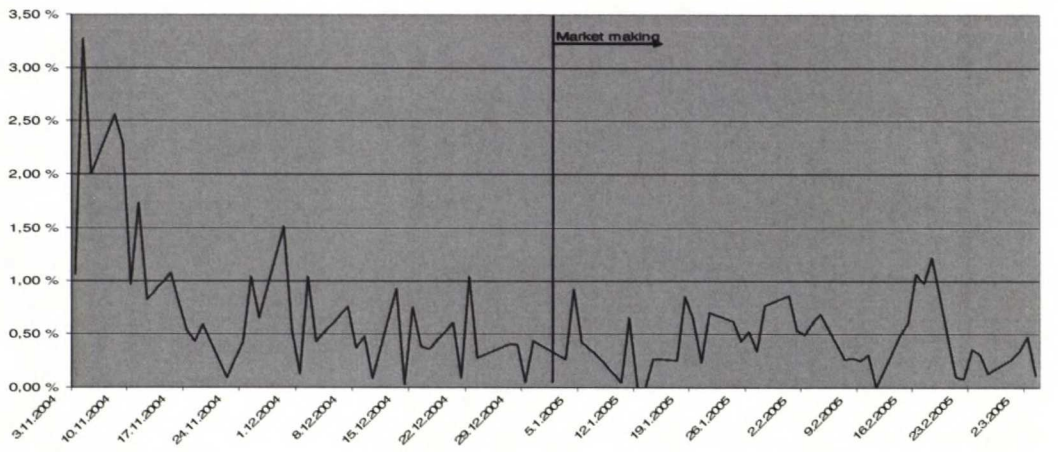


Rapala Oyj (RAP1V)

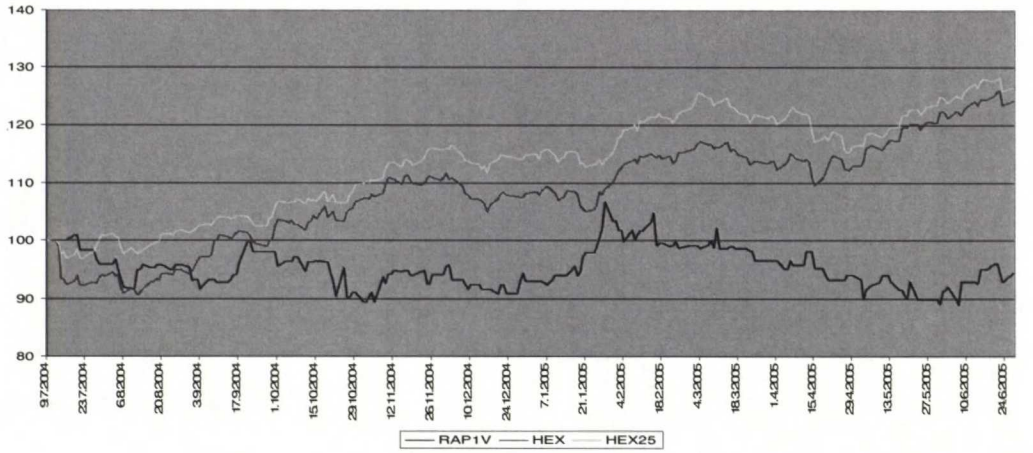
RAP1V average intraday spread



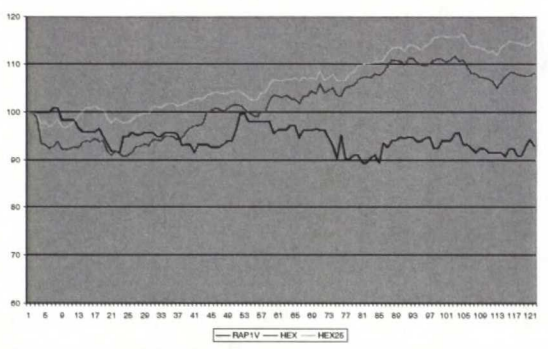
RAP1V intraday spread volatility



Rebased stock and index return



BEFORE MM



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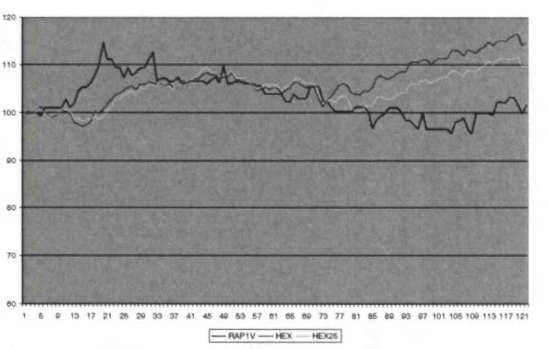
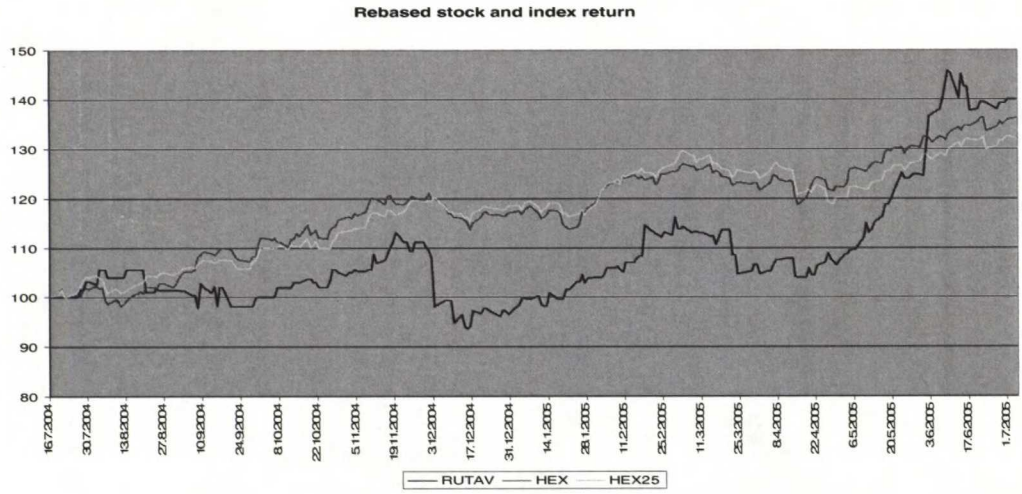
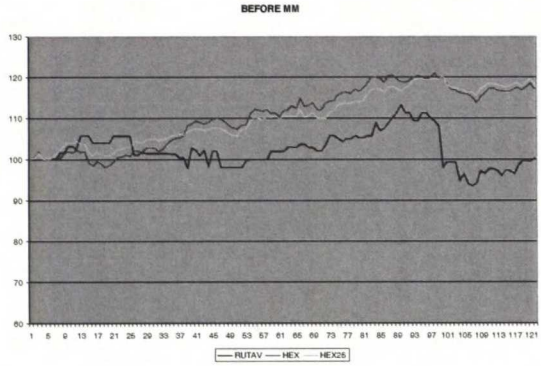
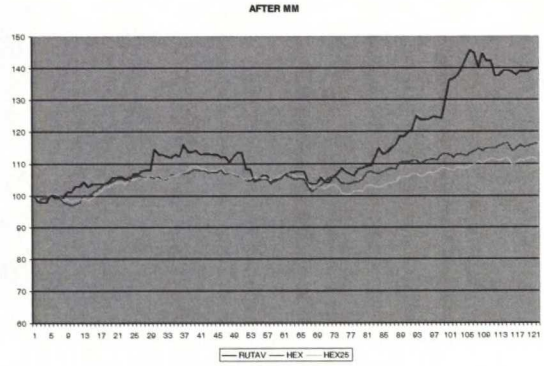


Raute Oyj (RUTAV)

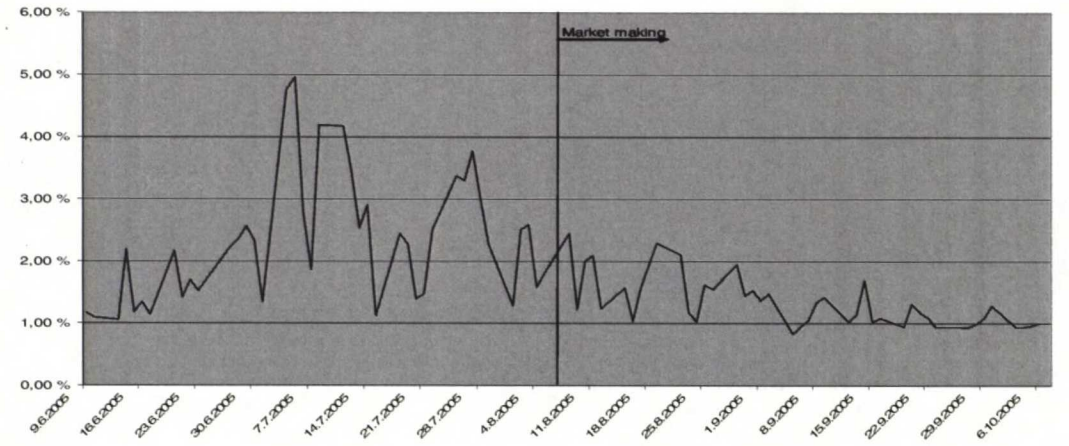




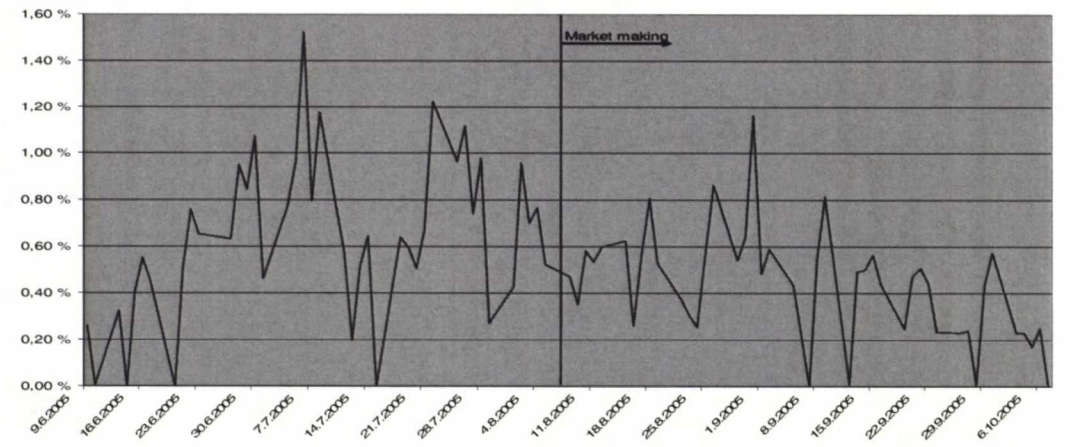


Satama Interactive Oyj (SAI1V)

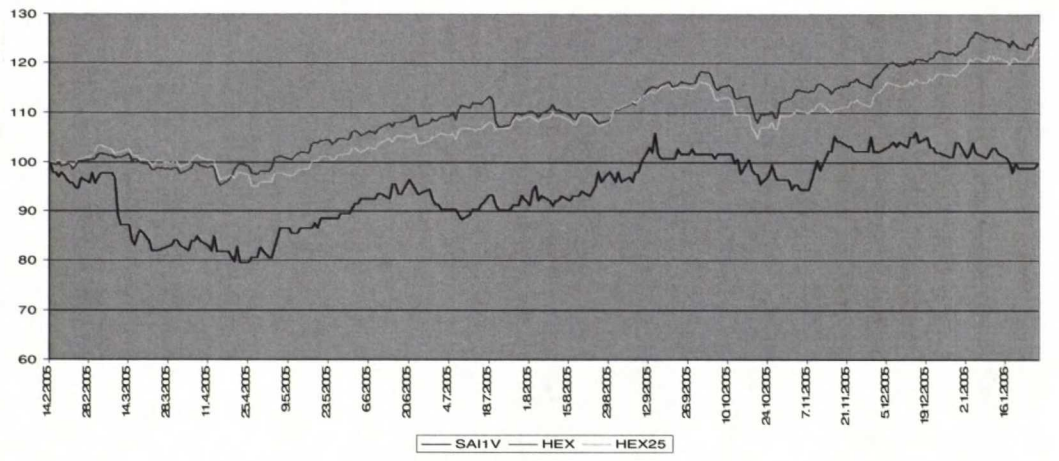
SAI1V average intraday spread



SAI1V intraday spread volatility



Rebased stock and index return



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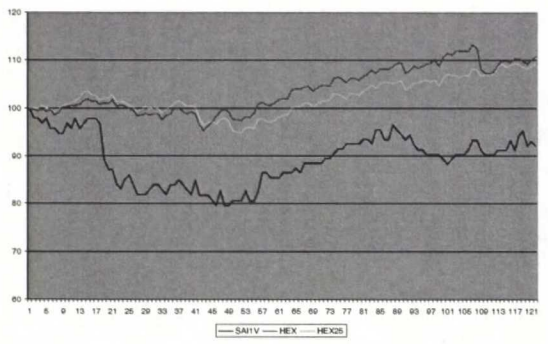

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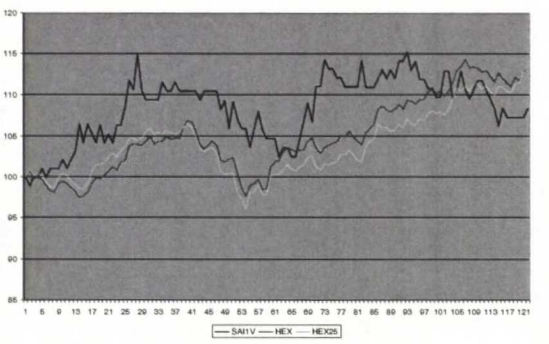
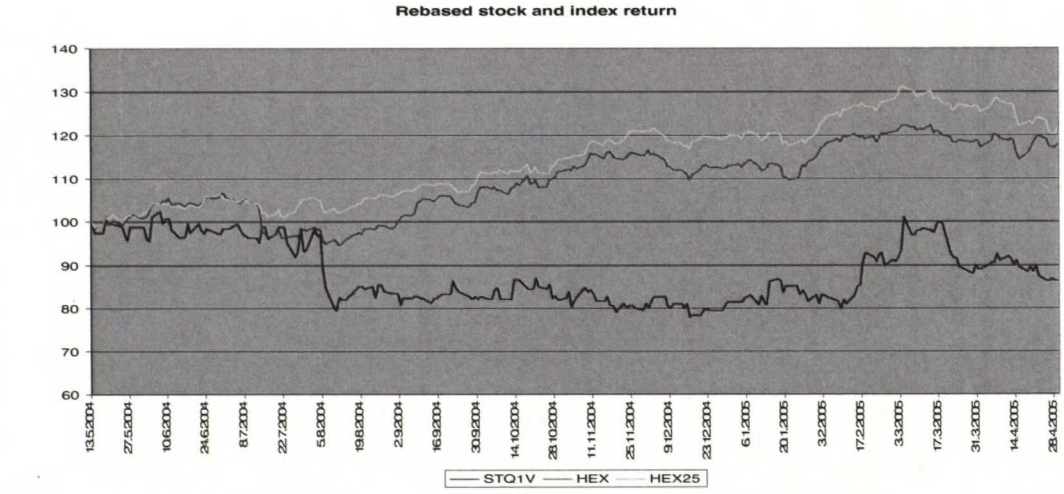
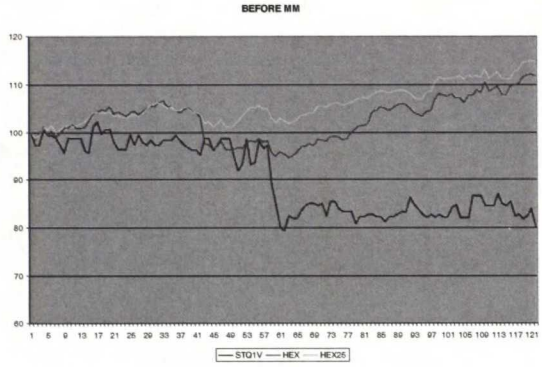
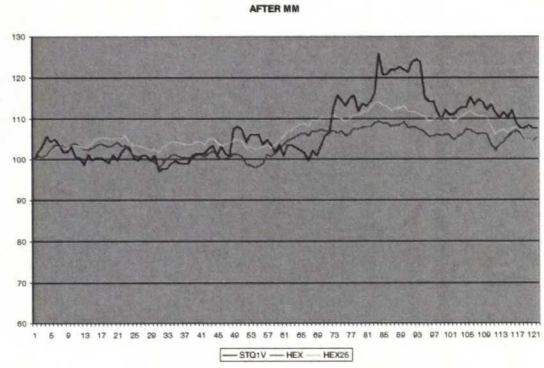


Solteq Oyj (STQ1V)

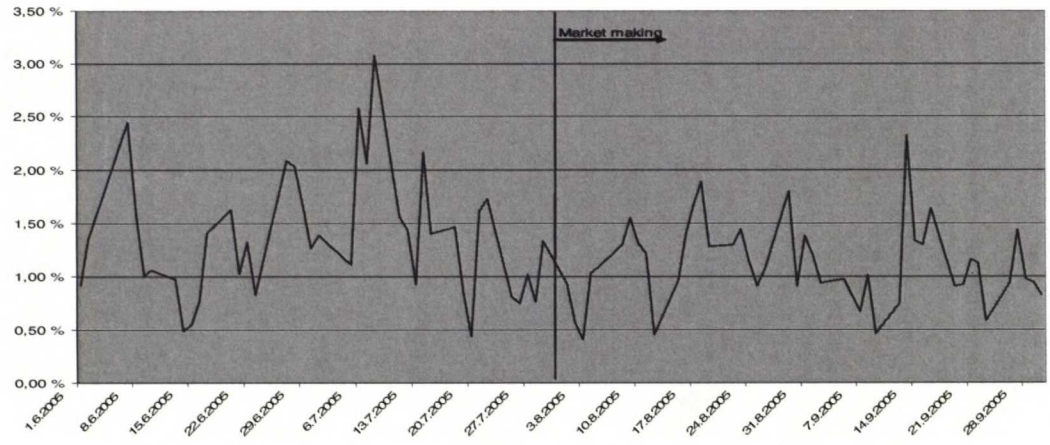




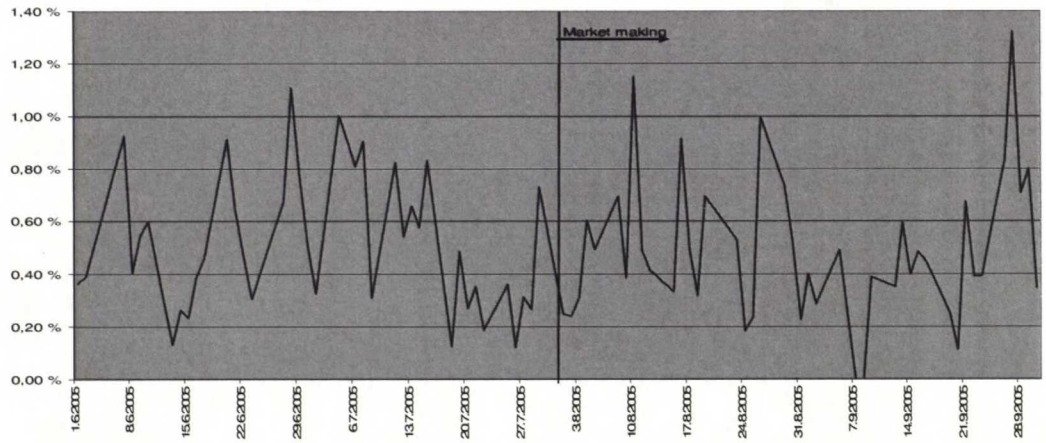


Tekla Oyj (TLA1V)

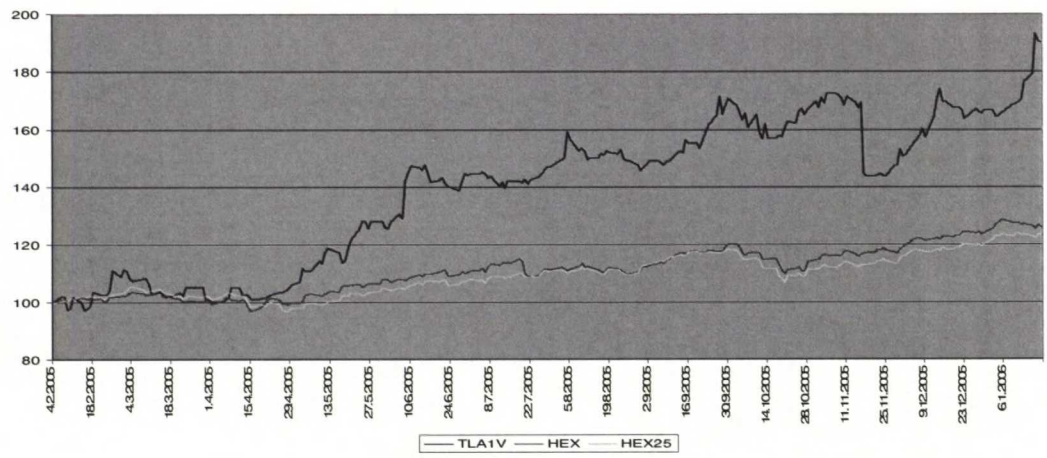
TLA1V average intraday spread



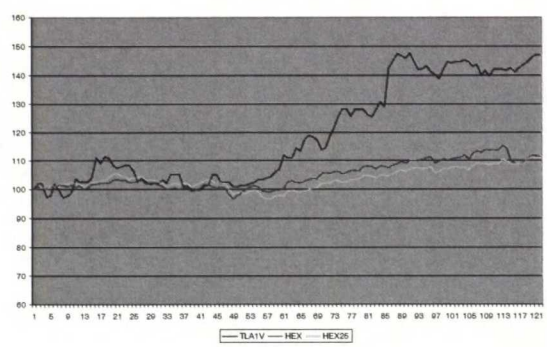
TLA1V intraday spread volatility



Rebased stock and index return



BEFORE MM



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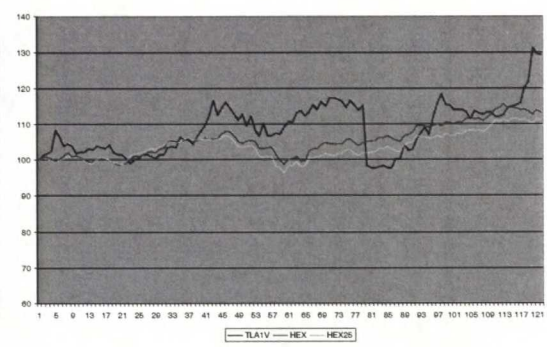
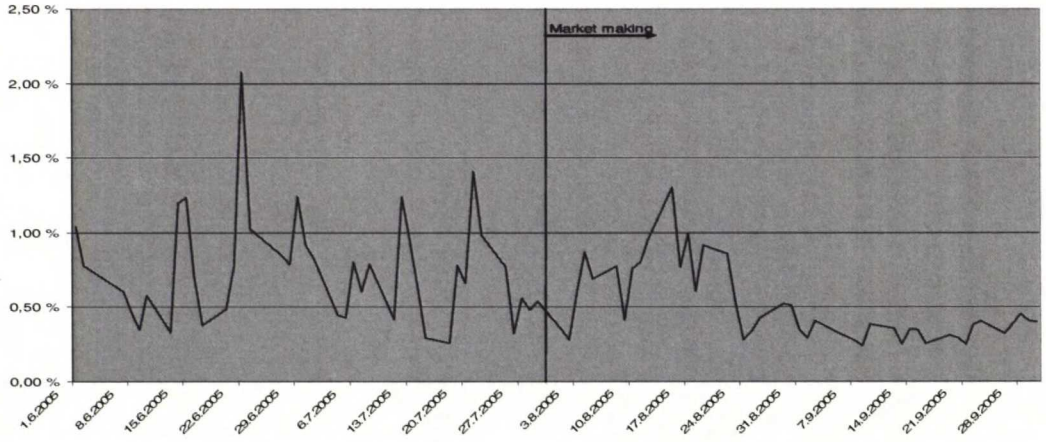
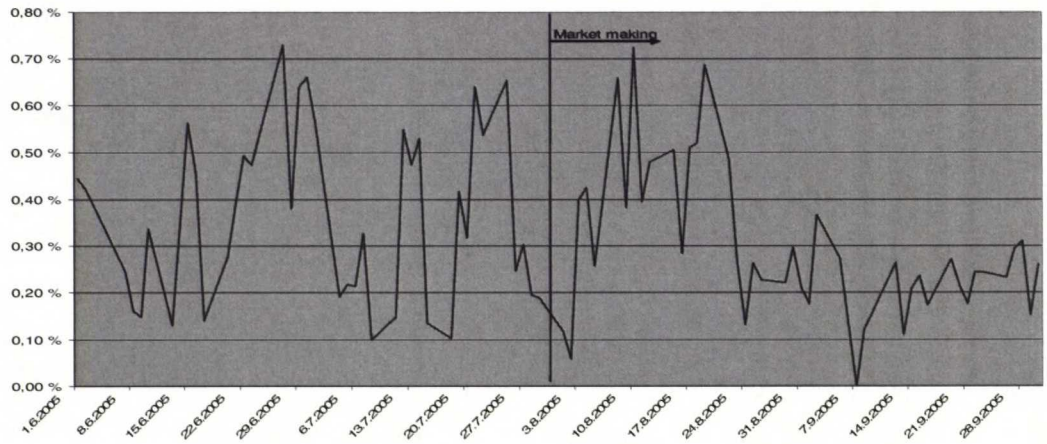


Teleste Oyj (TLT1V)

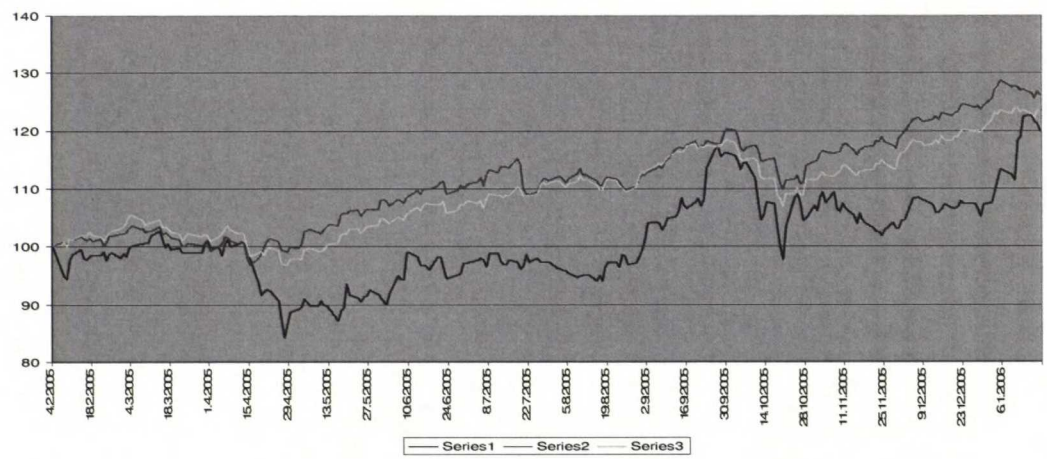
TLT1V average intraday spread



TLT1V intraday spread volatility



Rebased stock and index return



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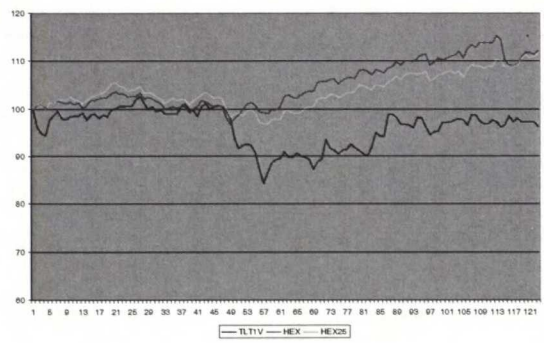

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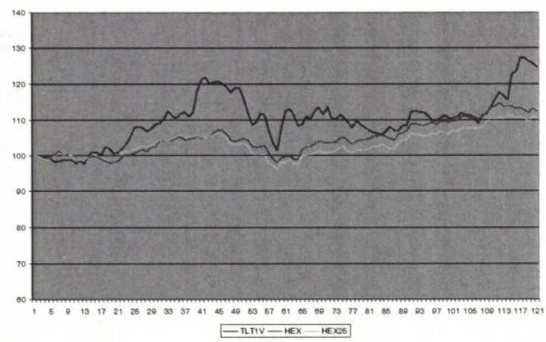
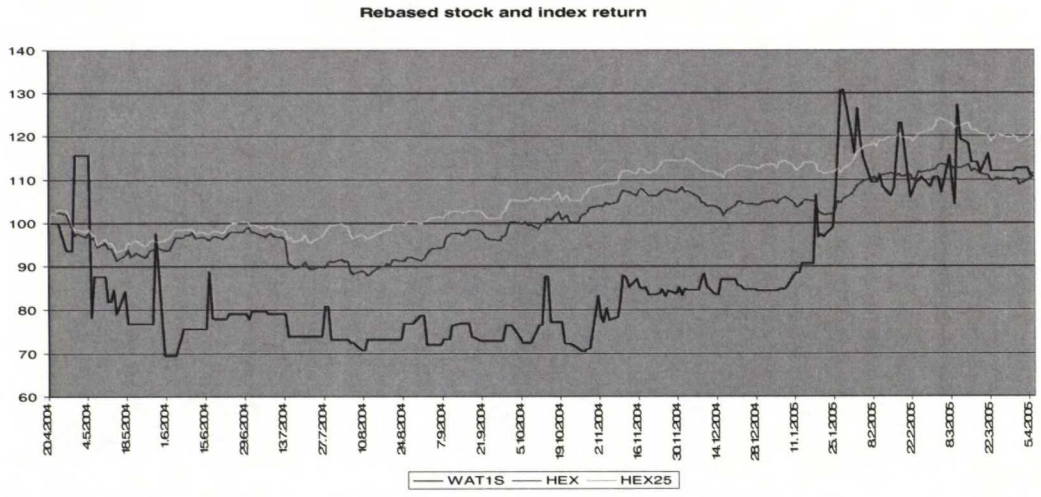
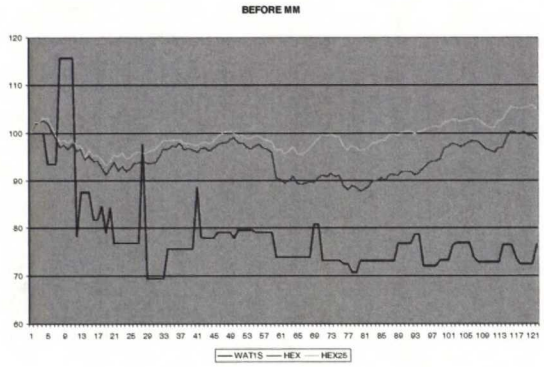
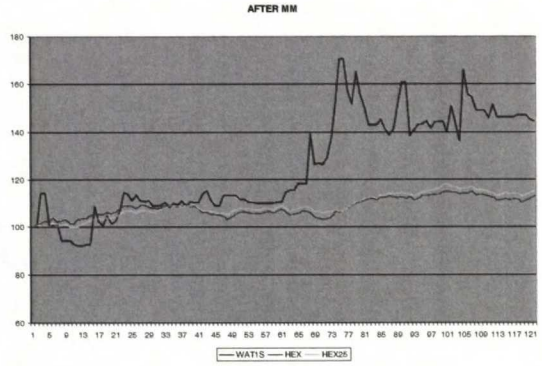


Waahto Group Oyj S-shares (WAT1S)







Waahto Group Oyj K-shares (WATKV)